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Mapping Practice:

On the Contingent Politics of Geographical Information Systems in UN Peace Operations

Victoria E E Loughlan

UN Secretary General Ban Ki Moon inspecting a map in the field (Source: ArcNews, ESRI, Spring 2010, Vol. 32, No.1, p. 18,19)

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Acknowledgements

In memory of Mary.

Battle-hardened, older, wiser, tired and yet stronger, I dedicate this thesis to myself. This has been an incredible journey in so many ways. As an educational degree it often drowns out the human dimensions – the life we have lived along side it, the struggles we had to face and the fights we battled… lost and won. More than anything this is what it has meant to me: reflecting on the person I have become with and through it, the people who have been with me, entered my life and lost, those who have given me so much as well as those who made it harder. There are many people to whom I owe thanks but will not be able to do them justice here. If they are not on these pages they are in my heart.

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J, we have been on most of this journey together. You have helped me grow intellectually and personally. The memory of this process is forever inextricably linked with you. While we have fought many battles together and lost the ultimate one, we stand today as the result of these. And with a sober mind, I am glad we are and I thank you for the time we have spent together. I will cherish it forever.

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The ritual of saying thanks means to begin to put a long process, and a chapter of life into perspective. And so beyond giving thanks it seems appropriate to me to articulate a message born out of this process. Let us never forget the human dimension, not just that of the subjectivities we study but our very own, not in reflexive but in real terms. Let the techno-bureaucratic, competitive, career-oriented machinery – encouraging us to be good and legitimate practitioners – not drown out the lives lived right in front of our eyes. Let us be kind

to one another, see and listen to one another. Let us stand up together and for one another when it does not serve us collectively.

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Abstract

This thesis investigates the use of Geographical Information Systems (GIS) mapping in UN Peace Operations. On the one hand, GIS use has been assumed to increase the efficiency and coordination of multi-dimensional peace missions. On the other, the Western universalist epistemology underlying GIS is thought to render its application, particularly in non-Western contexts neo-colonialist. These two framings of GIS as either inherently scientifically progressive or politically oppressive are over-deterministic. I argue that the politics of GIS use is contingent upon the ways in which understandings of the map are negotiated in practice.

As an ethnographic study of three UN GIS mapping sites (a field mission in Timor-Leste, the Cartographic Section at the UN headquarters, and the GIS Center at the UN Logistics Base), drawing on interviews with practitioners, the thesis gives an account of a) the role of GIS in the field mission, b) GIS practitioners' management of the technology and their everyday interaction with their clients, and c) its organization within the United Nations.

In the thesis I conceptualize an epistemological fault between the professional communities of mappers and their clients which organizes GIS use. This fault separates those who understand the map as political abstract model from those who see it as a mere image of the world. As a consequence, it also separates those who understand mapping as a political practice from those who see it as mere matter of logistics. The meaning and organization of GIS use is thus contingent upon how these different understandings are contested or affirmed in the interaction between mappers and clients. Overall, this thesis emphasizes the role of understanding technology, space and logistics in the context of the politics of Peace Operations.

Declaration

I hereby declare that, except where otherwise indicated, this thesis is entirely my own work, and that no part of it has been submitted for any other degree or qualification.

Victoria E E Loughlan

27th June 2014

Prologue: Why are we changing maps?

The West Wing, season 2 - episode 16 "Somebody's Going to Emergency, Somebody's Going to Jail,"
available at http://www.youtube.com/watch?v=n8zBC2dvERM, accessed 1st November, 2013

White House staffers meet the Cartographers for Social Equality. The cartographers want to lobby the President to support legitslation to change the world map. They argue that the Mercator projection has "fostered European imperialist attitudes for centuries and created an ethnic bias against the Third World" (West Wing, S2E16). Instituting the use of the Peters projection on the other hand would alleviate these grievances and enhance global North-South equality. The White House staffers are stunned and confused by this request, as they think of the map as synonymous with the world. The following briefly sets out the dialogue between cartographers and the White House staffers. It pithily illustrates the extent to which the cartographic imagination is normalized and how, as a consequence, questioning the politics of the map seems almost unnerving.

Dr Fallow (Cartographer): The German Cartographer Mercator originally designed this map in 1569 as a navigational tool for European Sailors. The map enlarges areas of the poles to create straight lines of constant bearing or geographic direction.

Dr Sales (Cartographer): So it makes it easier to cross an ocean.

Dr Fallow: BUT! [...] It distorts the relative size of nations and continents

CJ (White House Staffer): Are you saying the map is wrong?

Dr Fallows: Oh dear, yes. Look at Greenland..

CJ: Ok...

Dr Fallow: Now look at Africa

CJ: Ok…

Dr Fallow: The two landmasses appear to be roughly the same size

CJ: Yes!

Dr Fallow: Would it blow your mind if I told you that Africa is in reality 14 times larger?

Josh (White House staffer) shifts in his seat looking like a confused…

CJ: YES!

Dr Sales: Here we have Europe drawn considerably larger than South America, when at 6.9 million square miles, South America is almost double the size of Europe's 3.8 million.

Dr Fallow: Alaska appears three times as large as Mexico, when Mexico is larger by 0.1 million square miles.

Dr Sales: Germany appears in the middle of the map when it's in the Northern-most quarter of the earth.

Josh: Woah, woah, woah wait! Relative size is one thing but you're telling me that **Germany isn't where we think it is?**

Dr Fallow: **Nothing is where you think it is…**

CJ: **Where is it?**

Dr Fallow: I am glad you asked…

Switching the map from Mercator to Peters projection. CJ leans in closer.

Dr Sales: It has fidelity of access

Dr Fallow: It has fidelity of position.

Dr Sales: East-West lines are parallel and intersect North-South axes at right angles.

CJ looking at Peters Projection: **What the hell is that?**

Dr Fallow: **It's where you have been living this whole time…** […] So… you are probably wondering what all of this has to do with social equality…

CJ: **No, I am wondering where France really is!**

[…]

Professor Huke: Salvatore Natoli of the National Council for Social Studies argues: "In our society we unconsciously equate size with importance and even power"

There is a silence. CJ taps her fingers on her coffee cup….begins to nod in agreement….

Dr Fallow: When Third World Countries are misrepresented they are likely to be valued less… when Mercator maps exaggerate the importance of Western civilization… when the top of the map is given to the Northern hemisphere and the bottom is given to the Southern then people will tend to adopt top and bottom attitudes.

CJ is looking confused.

CJ: But…. Wait… How… where else could you put the Northern hemisphere but on the top?

Dr Sales: … on the bottom!

CJ: HOW?

Dr Fallow: Like this

Switches the map from the Mercator to the Peters projection

CJ: Yeah, but you can't do that

Dr Fallow: Why not?

CJ: **Coz it's freakin me out!**

This thesis picks up the question of how the map is understood and how this understanding influences the politics of the map.

Let's talk maps…..

1 Introduction: GIS 4 Peace, A Matter of Politics or Logistics?

Digital mapping is about to change our world by documenting the real world, then integrating the information into our computers, phones, and lifestyles. Roll over, Mason and Dixon: spurred by space photography, global satellite positioning, mobile phones, search engines and new ways of marketing information for the World Wide Web, the ancient art of cartography is now on the cutting edge.

(Levy 2004:78)

There is "no institution without space."

(Lefebvre 2003:84 quoting Louran)

This thesis investigates the use and integration of Geographical Information Systems (GIS) maps as logistics tools for UN Peace Operations. It takes as its point of departure – and offers a challenge to – the assumptions that GIS mapping will either increase the efficiency of state-building projects or that its inherent epistemological, material and representational politics render its application, particularly in non-Western contexts neo-colonialist. As a growing multi-agency organization with expanding mission mandates, the United Nations has been criticized for inefficiency and a lack of coordination. They have also been criticized for a one-size-fits all methodology in terms of their mandate implementation, breeding resentment amongst local populations of (post-)conflict countries.

The UN's introduction and use of GIS technology is thus situated in an effort to improve its operations. This effort can be described as a competent performance agenda which focuses on increasing efficiency and coordination within the organization. This investigation is an empirical multi-site study, drawing together data from the Timor-Leste field mission, the UN Logistics Center in Brindisi, Italy, and the Cartographic Section at the UN Headquarters in New York,

U.S. It is a practice-oriented examination of UN GIS practitioners and their work.

Within the academy, the use and meaning of GIS mapping in Peace Operations is under-researched. Indeed, this topic consistently escapes literatures, representing key challenges which frame this research project. The literatures of peace and conflict studies, geography and cartography, and science and technology studies have thus far been largely disconnected. These disciplinary literatures offer a wealth of reflections and analysis on Peace Operations, maps, and technology respectively. Yet, because they have not been brought together, the use of digital maps in Peace Operations has thus far not been constituted as one object of analysis.

Taking this object of analysis requires thus the challenging task of straddling and weaving together these literatures. This is the task of this introduction. It aims to survey and draw these literatures together, make them speak to one another, always relating maps to technology to Peace Operations. Two findings are central as a frame through which to read the following: on the one hand, the introduction demonstrates that even a bringing together of these literatures always falls short of completely grasping and holding together the object of analysis. This demonstrates the necessity of a practice approach which can achieve this holding together. On the other, these thus far isolated investigations of technology, maps, and Peace Operations mirror another conceptual separation central to the framing of the problem: the separation of politics from logistics – the repository of technologies and tools.

The thesis argues that the politics of GIS use, rather than *a priori* scientifically progressive or neo-colonial, is contingent. This contingency hinges on the ways in which understandings of the map

are negotiated in practice by mappers and their clients. I conceptualize an epistemological fault, manifest in two ways, which organizes this negotiation between the two professional communities of mappers and their clients. GIS use is socially and materially negotiated on the basis of whether first, the map is understood as an abstract model or a mere image of the world *and* second, whether mapping is understood as political or a pure logistical practice. Highlighting this conceptual separation as well as its contestation and affirmation, emphasizes the contingent political *and* logistical production of the politics Peace Operations. Moreover, the thesis demonstrates that logistics, far from merely offering a repository of technological tools, has its own conditions of possibility and actively shapes Peace Operations.

This introduction provides the context of this argument in three parts: The first outlines the introduction of GIS in UN Peace Operation. It explains the technology and sets out the UN's competent performance agenda which GIS ought to serve. The second part surveys and weaves together the different literatures ending with a brief discussion on the stakes involved in the analysis of GIS use in UN Peace Operations. Finally, the last section of this introduction sets out the aims and contributions and thesis overview.

GIS and the United Nations' Competent Performance Agenda

In the year 2000, the report of the Panel on United Nations Peace Operations, which reviewed the UN's peace and security- related activities, dedicated for the first time one paragraph specifically to the advocacy for Geographic Information Systems (GIS):

> "Peace operations could benefit greatly from more extensive use of geographic information systems (GIS) technology, which quickly integrates operational

> information with electronic maps of the mission area, for applications as diverse as demobilization, civilian policing, voter registration, human rights monitoring and reconstruction" (UN Security Council 2000: para. 20 (c)).

Currion, a GIS practitioner with experience in the humanitarian sector, notes that "although it was only a single paragraph in the 58-page Brahimi Report, this quote opened the floodgates for the introduction of GIS into humanitarian and Peace Operations" (Currion 2006:1). Since the 1980s, Peace Operations have been growing in terms of size, mandates, and actors involved. Missions have become more complex as they not only focused on peace-keeping but increasingly on governance reform. Coordination of mandate implementation amongst large and diverse military, civilian and political branches represented a huge challenge. Particularly in the 1990s and early 2000s, missions in Bosnia and East Timor for example, were heavily scrutinized, even criticized, for alleged mismanagement of UN involvement, breeding resentment in the local populations.

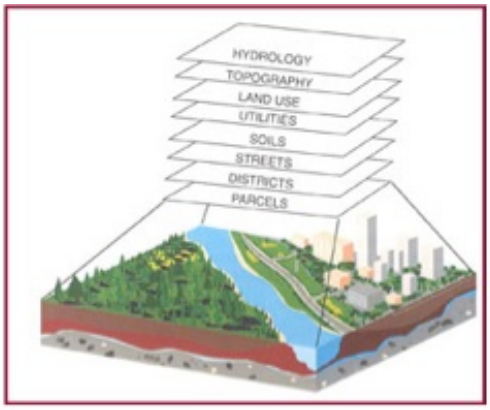
The advocacy for GIS, as represented in the Brahimi Report, is therefore based on two assumptions: first, as a data management system GIS would enhance the much needed *efficient use of information* within UN Peace Operations. Second, the *visualization power* of GIS outputs, specifically maps, would improve coordination. In short, GIS would improve the logistics of UN Peace Operations. Improving logistics by increasing efficiency and coordination represents – what I describe here as – the United Nations' competent performance agenda.

The assumption of GIS as a efficiency and coordination maximizer can be observed at the 2012 "Building More Effective UN Peace Operations" conference for example, hosted by the Permanent

Mission of Canada to the United Nations, and organized in association with New York University's Center on International Cooperation. Here, a paper described GIS as "allow[ing for] direct input from users in the field to shared databases, allowing data to be more easily organized, analysed, and shared with mission headquarters or with relevant actors anywhere in the world" (Center on International Cooperation, CIC 2012:1). The use of GIS as an information system which can store, manipulate and analyze large amounts of data fits into the agenda for increased efficiency. Its particular utility lies in its spatial data organization mode and its ability to visualize.

Differing from a generic database, a geo-database (from which GIS draws), consists of numbers, or rather coordinates, to which information can be attributed. In other words, any inputted information will always have an X/Y location in geographic space. This allows for spatial queries: for example, one can ask the database to visualize anything in a buffer zone of 5km from one's location. This could include demographic data, vegetation, slopes, or socio-economic data. All the information is geographically rooted. Customized applications are then programed to query the data for a particular purpose. GIS renders the world knowable through data points to ever greater and more accurate degrees. The world exists in data format which can be manipulated and analyzed according to any interest; so goes the logic.

Fig. 1 What is GIS?



Potential overlays through GIS (Source: U.S. Department of Transportation; available at http://environment.fhwa.dot.gov/integ/resources.asp, accessed 29th December 2013

The overlay mechanism is depicted above. On a base map different data categories can be layered on top of one another. This is similar to Google Earth applications. For example, locations of hospitals are recorded through GPS devices, by connecting to different satellites in space which, calculating the position, send the coordinates to the device. Once recorded, the data can be downloaded and stored in a database categorized by district. Census data can then be sourced, extracting information on, for example, low-income households. Through GIS, two data layers can be displayed on top of each other: one displaying the hospital locations, the other displaying the low-income areas. Based on such a map, public health officials can then emphasize access to health care services, reporting on where more hospitals may be needed. In this way, the visualization and overlay technique may influence decision-making, policy planning and implementation.

GIS are:

> "particularly powerful and useful computer-based data-handling, analysis and mapping systems that have the capacity for integrating spatial data of any kind: remotely sensed data from satellites and aircraft; aerial or topological information about spatial

> patterns; and discrete data sets that have spatial referents, such as Census data, township, country and state-level data, or site-specific or feature-specific data – point source polluters, production plants, rivers or air currents" (Pickles 2004:155).

GIS mapping represents the current peak of cartography as a science. It is an operational system in which geographically referenced data is stored and from which maps can be produced. Combining cartography and computer power to enable the management, analysis and visualization of large amounts of data, GIS has been termed "geography on steroids" (DeMers 2009). Although GIS can produce a variety of visual outputs, such as graphs and charts, maps still represent the most powerful and sought after output. Maps are familiar; they represent space in the world, rendering data in a recognizable format.

The UN's advocacy for the use of GIS which seeks to capitalize on its assumed potential to enhance decision-making, is couched in a larger ambition of the UN to improve its efficiency and coordination. The recognition that Peace Operations have increased in size and scope represents a logistical challenge. Military and civilian branches each have a huge range of operational needs and have to coordinate amongst them in order to share data and implement mandates coherently and efficiently. The Capstone Doctrine of 2008 states the need for reform in light of this expansion, which is

> "aimed at strengthening and professionalizing the planning, management and conduct of United Nations peacekeeping operations. A key objective of this ongoing reform process is to ensure that the growing numbers of United Nations peacekeeping personnel deployed in the field, as well as those serving at Headquarters, have access to clear, authoritative guidance on the multitude of tasks they are required to perform" (UN DPKO and DFS 2008: 6)

The following New Horizons Report on Peacekeeping in 2009 references the "better use [of] technology" as a way "to support lighter, more agile deployment" (UN DPKO DFS 2009: vi) in an era of "growing multi-facetted Peace Operations in strategic uncertain times" (Jones, Gowan, and Sherman 2009).

Technology here is thus seen as a tool to integrate, move information faster, operationalize and help coordinate the mandates of multi-dimensional Peace Operations. The need for integration culminates in the Global Field Support Strategy (GFSS) (UN Secretary General 2010). The GFSS reiterates the Brahimi Report's acknowledgement: the "need [for a] global system to match the global enterprise [Peace Operations have] become" (UN Secretary General 2010: 2). The use of technology as "strategic enabler" is situated within the ambition to operate on a "global service-delivery model" (UN Secretary General 2010: 3). Technology is understood as a tool through which to enable and improve the coordinated execution of missions. In other words, coordination ought to be technologically enabled. The advocacy for GIS is therefore couched within a broader endeavor to improve the overall use and integration of Information and Communications Technology (ICT). The UN ICT Strategy for the Secretariat seeks to "overcome the difficulties attributable to a highly fragmented ICT environment and to leverage ICT in order to increase the Organization's effectiveness and efficiency in delivering United Nations services to the global community" (UN OICT 2010).

GIS is one amongst other technologies into which this hope for more efficiency and effectiveness is inscribed: high-resolution satellite imagery, night vision technology, surveillance and monitoring through high-zoom digital cameras, motion detectors, closed circuit television and digital video networks, aerial reconnaissance, and smartphones (Dorn 2011; see Center on International Cooperation,

CIC 2012). Yet, because of the power of its *visualizations*, from overlay maps to customized applications and analysis, GIS is coined as an efficiency-maximizer, problem-solver and invaluable planning tool. The importance of geographic information to Peace Operations is evident in the set up of a UN Spatial Data Infrastructure, a part of this UN ICT strategy and the "UN system-wide harmonization". It seeks to "establish a common approach and standards to managing geospatial data, to enable its efficient use across the UN System" (UN OICT 2010). As the chief of the UN Cartographic Section states: "Peace Operations are happening somewhere and we can show what this somewhere looks like. We can be the eyes of the mission" (Interview, 23rd August 2011, New York).

As stated above, the multi-dimensional character of Peace Operations demanded enhanced efficiency and coordination to underwrite strategic planning and implementation. The assumption that GIS could be a useful tool to aid this agenda, as evident in the United Nations discourse, is also reflected in the rampant spread and impact GIS has had in other sectors: particularly in the military, private sector, public administration, and increasingly, the normative policy areas such as humanitarian work. According to Satyanarayana and Yogendran on the GIS Lounge blog, GIS has "revolutionized" military operations (GISLounge, 2007). From terrain visualization, and analysis, battlefield management and strategic planning, GIS has come to play a "pivotal role" in the military (Ibid). It has also become a vital tool for intelligence agencies. In the U.S. "one of the leading GIS companies is a 'strategic partner' of NGA (National Geospatial-Intelligence Agency)," (Crampton 2010:121). This link demonstrates the integration of the technology in the intelligence sector.

Moreover, cities, such as Seattle and Wichita in the United States, have begun to use GIS for governance purposes. Wichita has

developed over 250 data layers used by "all city departments for analysis and decision-making" (Witchita City, accessed 2013). Scotland has a Geographic Information Systems Strategy which seeks to enable the use and effective sharing of geographic information for policy and public administration (Scottish Government, 2005). Even in the private sector, UPS claims it has saved millions in fuel costs, time and emissions by calculating the most efficient routes based on a GIS application called "package flow" (an application that has now been sold to Pepsi; GISLounge, 2007). Saving money through efficiency is in times of austerity an attractive feature.

Mapping technology has been spreading into the normative sector and of course Open Street Map has become one of the most famous response tools to crisis management after the Haiti earthquake. In a short period of time after the disaster struck, high resolution imagery was populated with data from people all over the world, producing a basemap which "became the default basemap for responding organizations such as Search and Rescue teams, Humanitarian mapping NGOs like MapAction and iMMAP, the United Nations and the World Bank" (OpenStreetMap, accessed 2013). Projects such as MapAction provide geographic information to humanitarian organizations (MapAction, accessed 2013). In an interview, the head of the International Red Cross René Saameli, summarizes the benefits of GIS as follows:

> "GIS are marvellous tools for more effective decision-making and action. For example, when you're planning to distribute food or other supplies in remote areas, it's vital to know where the beneficiaries are, how to reach them and what infrastructure they already have. Obtaining a map that provided this information used to be quite difficult, or simply impossible because the map didn't exist. Today, basic maps are much more readily available. And a lot of progress has been made with GIS methods that enable us to map and share

> this information. In fact, they have completely revolutionized the way we work" (ICRC, 2012).

As Crampton states, "GIS is something like a $10 billion a year corporate-military business" and it is growing (2010:3).

Having outlined how the introduction of GIS into UN Peace Operations is couched in an effort to improve efficiency and coordination, I now turn to the task of surveying the relevant academic literatures. As stated in the beginning of this introduction, the challenge is to draw out and weave together the expertise of the literatures of peace and conflict studies (and its parent international relations), geography and cartography and science and technology studies. I seek to bring them together in order to tease out how they collectively bear on the object of analysis: the use of GIS in UN Peace Operations.

The unpacking of the literature proceeds in two ways: First, what is the specificity of Peace Operations? In the beginning of this introduction I mentioned the growing complexity of missions on the one hand and their problematic track record on the other. It is therefore necessary to outline in greater detail how Peace Operations are understood in the literature. The focus is specifically on how the literature examines the political agenda of Peace Operations in relation to their logistical implementation. This is necessary in order to tease out how to situate GIS as a logistics tool in this political agenda. More broadly, I ask, what is the relationship between politics and logistics? The review of the peace and conflict literature demonstrates that this relationship has thus far not been paid much attention. Logistics is separated from politics in peace and conflict studies and is only of concern to the extent that it enables or obstructs the implementation of a political agenda or project. Either the right kind of process and/or technology is in place – e.g. choosing

GIS – or it is not. Logistics is not considered as a topic with its own conditions of possibility, which not only stand in direct relation to, but are part and parcel of, political concerns. Therefore, this section sketches out what the implications are of extending the politics of Peace Operations to include GIS as a logistics tool.

Second, therefore, the specificity of GIS as a technology, which, in its outputs represents space through maps, requires unpacking. Schematically examining relevant literatures demonstrates that IR has not as much to offer on the themes of technology, space and maps as critical geography and cartography and science and technology studies. While the peace and conflict studies literature largely separates logistics from politics, these literatures infuse logistics with politics. In other words, they treat technology, space and maps in their own right, examining their politics. Examining these literatures demonstrates that space, maps and technology have been considered political but have thus far not been examined as such in the context of Peace Operations.

I argue that understanding the impact of GIS on the competent performance agenda of Peace Operations is not merely a logistical question but also a political question. In short, logistics has a political dimension, if, as we shall see a contingent one. I therefore present an inter-disciplinary unpacking of the object of analysis – the use of GIS in UN Peace Operations. This serves to outline the necessary customized theoretical and methodological approach.

Understanding Peace Operations

The interest in this topic stems from my Masters Degree in Peace and Conflict Studies (MLitt). It focused primarily on the critical examination of the evolution of Peace Operations since WWII and their current governing rationale represented by the Liberal Peace.

This Liberal Peace framework constitutes the climactic outgrowth of the assumed triumphant victory of the liberal West over the Communist East at the end of the Cold War. It premises that the ingredients of a liberal democracy, a free market, and human rights guaranteed by the state and the rule of law, constitute the proven recipe for sustainable peace and security, and thus ought to be adopted by all states. While the Masters program focused on the expansion of missions from peace-making, to peace-keeping to multi-facetted peace-building operations and their ever greater meddling in the governance affairs of their target countries, I became interested in the underlying spatial architecture of these missions.

The clearly strong spatial undercurrent of the narrative of *building peace via the state* has hardly received any attention in comparison to the abundant conceptual discussions of the Liberal Peace as a framework. I was interested in the spatial logistics of missions: How do peace-building and state-building practitioners produce spatial knowledge of the (post-)conflict country? How do they know where anything is, or where anything should go? And does this spatial knowledge influence the way in which state-building is planned? What exactly is being *built* and how? These questions echo the efficiency and coordination concerns of Peace Operations set out in the beginning, which GIS is considered to address. In the following section I will elaborate on these questions, their relevance and significance to the object of analysis by engaging in a conversation with the literature on Peace Operations.

That building a strong state is a precondition for building a sustainable peace has long been recognized in the literature (see for example Paris 2002; Paris and Sisk 2009; Chandler 2013) and is observable in practice. Peace-keeping and peace-building is not just about ending violence but about creating conditions in which peace

can be sustainable and the liberal democratic state is considered the ultimate framework. As a consequence, Peace Operations have grown into multi-dimensional missions often with military, civilian and political components. They are constituted by a huge infrastructure within post-conflict countries operated by an alliance of UN agencies, local and international organizations, and NGOs.

The expansion of Peace Operations since the late 1980s is couched within the aforementioned triumphant history of liberal governance. After the fall of the Soviet Union, the uni-polar moment, according to Fukuyama, represented the "end of history" (1992), affirming the victory of liberal governance as the apex of political evolution of the Liberal Peace. It is this framework which dictated the response to the so-called 'new wars' of the 1990s (Kaldor 1999). From the late 1980s onwards, the expansion of Peace Operations from monitoring and observing peace agreements into the domestic political affairs of the state can be observed. In UNTAG in Namibia, for example, this was reflected in the mission mandate including democracy promotion and electoral monitoring.

Throughout the 1990s, peace missions proliferated and the mandates continuously expanded to focus increasingly on governance. In Cambodia and Bosnia, missions acted as international administrations of the state while in Kosovo, and in the early 2000s in Timor-Leste, they culminated in the UN representing a quasi-sovereign through transitional authorities, all in the effort to build and maintain the state architecture. Peace Operations thus not only sought to end violence, observe a cease fire and keep combatant parties apart. Peace-building projects also included the implementation of democratic and neo-liberal market reforms in order to create cohesion, accountability and provide for economic growth (Pugh 2005). They evolved into integrated missions with an

inherent governmental focus, thus setting out to alter the political, economic, and social landscape of a host country.

The motivation for intervention by the international community can be explained in two ways, following on the one hand a normative agenda, and on the other hand a security agenda. First, weak, fragile or failed states are seen to be more prone to conflict and thus present an obstacle to the UN Millennium Development Goals. In an OECD paper on failed states it is argued that "states are fragile when state structures lack political will and/or capacity to provide the basic functions needed for poverty reduction, development and to safeguard the security and human rights of their populations" (OECD 2007). Building up these structures, in other words, strengthening the state apparatus is regarded as a framework to enable sustainable peace. In the academy as well, following the democratic peace thesis, the correlation between liberal forms of domestic order and the absence of conflict was supported (Doyle 1999).

Second, weak states may also turn 'rogue' by providing a 'safe haven' for terrorists. As Rotberg argues, because fragile or failed states represent anarchic spaces, they "have come to be feared as 'breeding grounds of instability, mass migration, and murder' […], as well as reservoirs and exporters of terror" (Rotberg 2002). Particularly, the post-9/11 era intensified this rationale, manifesting the framing of peace-building through state-building as a security imperative. This is reflected in the interventions in Iraq and Afghanistan where the building of the state is seen as a prerequisite to building and maintaining, not just domestic, but also international security. Ultimately, peace via the security-development nexus (Duffield 2010) is inscribed in the liberal state as its guarantor.

Following these imperatives, Peace Operations increased. However, the methodologies which were born out of these imperatives became heavily criticized. Peace-building strategies are twofold, focusing on building, extending and maintaining the state apparatus on the one hand, and civil society on the other (Chopra 2000; Chandler 2006). Approaches vary in their point of departure from more rigorous top-down to more bottom-up grassroots orientations. However, despite their end goal being the production of a 'healthy' modern liberal sovereign territorial state, in a lot of cases peace missions have not yielded the desired result. Not only has a Liberal Peace not emerged but the imposition of neo-liberal universalist reforms by threat of sanctions has been contested and bred resentment, as experiences in Bosnia, Kosovo, Timor-Leste, Iraq, Liberia and Afghanistan demonstrate (Richmond 2010). The up-take of GIS as a visual logistics tool must be understood not only in the context of a coordination challenge set by the multi-dimensionality of missions. It must also be recognized within the context of missions' politically problematic methodologies.

The normative and security imperatives, which propel the proliferation of these multi-facetted Peace Operations, their failure to produce sustainable peace as well as the resentment they caused, also produced a variety of responses within the academy. Outlining these however, demonstrates the lack of attention paid to understanding logistics in relation to the political agenda of missions. Autesserre categorizes these responses into rational choice and constructivist analyses (Autesserre 2011).

She allocates the rational choice literature mainly but not exclusively to the discipline of international relations. Here, scholars "emphasize that vested interests and material constraints determine peace intervention strategies" (Autesserre 2011:1; see for example Zartman

1985; Stedman, Rothchild, and Cousens 2002; Doyle 2006). They focus particularly on whether they work and how to improve their success rate (Fortna 2008; Howard 2008). Given the less than perfect track record of Peace Operations, rational choice approaches are concerned with salvaging the Liberal Peace framework by making it stronger and more efficient. Krasner for example argued for the adoption of 'shared sovereignty' (Krasner 2005), and Fearon and Laitlin for a form of 'neo-trusteeship' (Fearon and Laitlin 2004) in which the international community takes on the role of governance while a country is experiencing a crisis.

From a more democratic point of view, Chopra argues for a pursuit of 'peace maintenance' in which the UN acts as an "outside guarantor of a kind of internal self-determination" directly tied to "the domestic population" by maintaining law and order (Chopra 1999:10). Paris argues for an IBL approach: 'institution before liberalisation' in which the state infrastructure requires strengthening first before imposing economic and governance reforms (Paris 2004). Indeed, that lessons have to be learned has come to be part of the mainstream literature as the work of Paris for instance demonstrates. He argues that state-building is fraught with problems which require addressing; yet, as a project it is nonetheless necessary (2009). The political agenda therefore remains more or less unquestioned. The Liberal Peace still represents the right recipe. From the rational choice perspective the solution is represented in choosing how to mix together the ingredients of the liberal governance model, what sequence they should follow and what tools should be used to operationalize them.

These methodological concerns articulated in the academy are reflected within the United Nations. In UN documents the need for better integration is also recognized as the set up of global service Centers via a 'global service-delivery model' in the Global Field

Support Strategy demonstrates. The problems of state-building are not necessarily due to the Liberal Peace recipe but are down to the lack of strength of enforcement, coordination or as Dodge argues due to a lack of resources (2006). According to Autesserre, these approaches "look at intervention failures as a 'problem for which technical solutions could be worked out,' such as additional resources or more robust involvement" (Autesserre 2011:1 quoting Rubenstein). Proponents thus maintain the framework's progressive merit, re-affirming the normative and security agenda and sought to address its problems by merely enhancing efficiency. There is no deeper investigation to understand how the methods, i.e. logistics, sit with the political project.

The constructivist approaches, according to Autesserre represent a juxtaposition to the rational choice approaches and look at the "influence of beliefs, cultures, discourse, frames, habitus, identity, norms, representations, symbols, and worldviews [….] on Peace Operations" (2011:1). These she frames as being interested in the "collective or shared understandings" which underwrite Peace Operations (ibid.).

The Liberal Peace represents just such a 'shared understanding' underwriting Peace Operations. As a "culture which relies on Western, liberal values, [it] is dominant on the international scene and shapes all of the international organizations' strategies in a similar manner" (Autesserre 2011:4). This is also what Richmond calls the "peace-building consensus" in which the alliance of international organizations, International Financial Institutions, and NGOs which plan and deliver Peace Operations agree on this framework (2004). Some scholars in this tradition have focused on examining the underlying liberal, indeed normative, universalist assumptions of peace-building – democracy, the free market and

human rights work for everyone – as well as the effects of their rigorous top-down implementation or in depth social engineering (Geuss 2002; Paris 2002; Bishai 2004; Jahn 2007).

Indeed, the lack of local ownership in the peace-building process, the blindness to local circumstances as well as the conditionality and prescriptive character of peace-building missions renders this recipe as politically and economically hegemonic, and are tagged by some even as neo-colonial projects (see for example Duffield 2001; Chandler 2005; Richmond 2005a; Lidén 2009; Lidén, Mac Ginty, and Richmond 2009; Mitchell 2009; Tadjbakhsh 2009; Walton 2009). Peace Operations from a 'recipe' perspective then merely become an exercise in ticking boxes, inserting all the ingredients (Autesserre 2011:4). The Liberal Peace critique seeks to make the point that as long as assumptions remain universalist, are implemented irrespective of the local conditions, and blind to cultures on the ground, Peace Operations will continue to breed resentment and fail to build sustainable peace.

An outgrowth of this critique is represented in the move towards re-conceptualizing the framework for peace from an 'oppressive' imposition towards a more emancipatory peace. In this vein, themes proposed conceptualize a post-liberal outlook, focusing on the 'local everyday' and notions of empathy (Pouligny 2006; Bleiker and Hutchison 2008; Richmond 2009). Here the engagement with the local subject as a locus for re-imagining and re-conceptualizing sustainable peace stands in the foreground. Accounting for the resistant strategies of co-option and adoption to be discovered in the 'local everyday', reframed the ontology of peace from its liberal grounds to one of hybridity (see for example Mac Ginty and Sanghera 2012; Richmond and Mitchell 2012). In other words, since no pure forms of the Liberal Peace have been built, local agency contributed

to a form of peace, which mixed both liberal and local understandings. [1] Thus, reframing the focus towards local agency, to give it more voice in the process, represents an avenue for a more emancipatory conceptualization of peace in this branch of scholarship.

The Liberal Peace critique has been powerful as the proliferation of its application in the academy and acknowledgement in Peace Operation practitioner's discourse demonstrates. Yet, by now it has been softened if not weakened by other analyses which claim that the Liberal Peace is not as ubiquitously shared as assumed. Autesserre argues that it is not merely one 'shared understanding' but "a multiplicity of collective understandings [which] orient peace interventions" (Autesserre 2011:3). Thus, the turn towards the local represents the examination of local collective understandings which as well 'orient' and influence Peace Operations. The discourse on hybrid forms of peace attest to the salience of this influence. Yet, it is the recognition of existing multiple understandings, which orient Peace Operations (local and liberal), which opens up the question of logistics and its situation in relation to the liberal political project of intervention. Indeed, how homogenous is the understanding of the liberal project?

It is important to point to Autesserre's earlier work here. In her 2010 book she examines the failure of the international intervention in the Congo. She argues that a dominant peacebuilding culture owned by polticial elites and diplomats framed the understanding of the conflict

[1] It is important to point out that several scholars have pointed out that liberalism itself has always been a hybrid practice, and thus never existed in a pure form (see for example Hindess 2004, for a theoretical line of argument and Hoenke, 2013 and Laffey and Nadarajah 2012 for analyses of hybridity in the context of security governance practices).

and therefore influenced the responses. This dominant culture did not allow for an engagement with local grievances but focused primarily on regional and national dynamics. Based on one year and a half of in depth fieldwork Autesserre concludes that this narrative held at the top was so powerful that it drowned out the voices of local peacebuilding efforts as illegitimate. Connecting this work with the question of how homogenous the liberal project is, highlights the homogenizing power of the peacebuilding consensus at the top. Yet, Autesserre's analysis is underwritten by the argument that it is the extent to which understanding is shared which constitutes the force of the narrative. Moreover, she emphasizes the multiplicity of existing understandings. Therefore, this thesis carefully builds on Autesserre's work by taking a logistics angle based on mapping in order tease out the understandings underlying it and how these relate to the political narratives and objectives of Peace Operations. I argue that logistics is not a mere extension of a political project by merely operationalizing it. It has its own conditions of possibility, its own parameters of understanding which stand in relation to the political project. This recognition opens up what is considered 'the liberal peace' to unearth logistical understandings at play in its constitution.

Autesserre for example points to organizational studies, such as Barnett and Finnemore's work (2002, 2004) which highlights that organizations themselves exhibit a specificity to the practice of peace operation which does indeed rely on collective and shared understandings but that these are not merely represented by the Liberal Peace. Their practices, even of the Liberal Peace framework are crucially shaped by their "internal cultures" (Autesserre 2011:5). Thus, the 'enactment' of liberal ideas goes through interpretation and translation processes framed by the organizational culture itself. Outcomes are therefore not *a priori* set by liberal universalism. The

failure to produce liberal outcomes in a concerted effort is not a mere question of better integration or coordination: it is a question of cultures and understandings. The question then is how do logistical understandings, i.e. the understandings underpinning GIS impact the implementation of Peace Operations?

Moreover, Autesserre points out the problem that there is also an implicit assumption that "the micro level is a mere replica of the macro level and consequently, that developments on the national and international scenes – or actions taken by interveners in the upper political spheres – automatically result in similar transformations in the field" (Autesserre 2011:5). Thus, she points out distinctions *between* 'liberal actors' based on their geographical and political position as well as their mandate. She argues that there is a difference in what is considered a 'shared understanding' between the state and political elite and the field or between the post-conflict capital and rural areas. Autesserre writes, "the collective understandings prevalent in the field are often different from the shared understandings dominant in national capitals and headquarters" (2011:5).

Invoking these distinctions between organizations and contextualizing professions within these organizations opens up the possibility for investigating the differences amongst liberal actors further. Thus far there is very little knowledge on how different "kinds of peace actors and functions interact on the ground" (Autesserre 2011:8). She argues that little work has been done particularly on comparing professional cultures. For example, some work has focused on comparing the different modus operandi of the military component of missions and that of humanitarian, development and aid workers (Slim 1996; Duffey 2000; Winslow 2002; Rubinstein 2008; Rubinstein, Keller, and Scherger 2008). This work highlights

how within an organization or within a Peace Operation different kinds of shared understandings interact, clash or are translated. This presses the question of how GIS practitioners understand their work in relation to Peace Operations and political objectives. More and more peace-keeping operations have GIS units attached to their field missions. What is the understanding of those practitioners? Is this understanding shared, and if so, to what extent and with whom?

Differentiating between professions within Peace Operations then further begs the question of how different actors with different backgrounds work together and the extent to which understandings are compatible and translate into one another. In other words, how easily are different actors able to communicate their work, understand the work of others and are thus able to collaborate? This can be framed as a matter of "interoperability" – in Rubinstein et al's words – of "distinct and unique professional culture[s]" (Autesserre 2011:7).

Rubinstein follows Roy d'Andrade's conception of culture:

> "as consisting of learned systems of meaning, communicated by means of natural language and other symbols systems, having representational, directive, and affective functions, and capable of creating cultural entities and particular sense of reality. Through these systems of meaning groups of people adapt to their environment and structure interpersonal activities" (d'Andrade 1984:116).

To complicate matters further, these systems of culture are not static or structural but are a "fluid pattern of beliefs that orients and constrains rather than determines behavior" (Rubinstein et al. 2008:542). The emphasis on culture is important in relation to the introduction of GIS: As Elzinga argues,

> "the first introduction of new technologies involves not only new modes of organization of social relations but

> also a triggering of cultural nerves. Through this imagery linked to it in public discourse, be it in debates or through art and literature, a new technology is domesticated; it is actively made part of [the] repertoire" (Sørensen 2004:187 quoting Elzinga 1998).

The adoption of GIS use into Peace Operations is therefore bound up in processes to 'domesticate' it. It is not a matter of mere use and execution but comes with specific technological understandings, which require translation into the other already existing organizational cultures. Thus, the culture lens allows for a nuanced examination of how certain understandings are grouped, how they relate to one another, and the ways in which they translate or clash, thus influencing the operation of the mission. GIS is not a seamless methodological extension of how Peace Operations are understood, but its use requires explicit negotiation.

Several insights can be drawn from these scholarly engagements which aid in situating the aims and interests of this thesis: The rational choice branch of scholarship is interested in the salvation of the Liberal Peace and sees this as more or less a technical exercise in which the goal is to achieve better coordination making projects more effective. Indeed, this goal to achieve greater integration and effectiveness is mirrored in the UN documents on technology set out in the beginning. The Global Field Support Strategy for example demonstrates this by emphasizing the aspiration of using a 'global service-delivery model.' The UN spatial information framework too, seeks to enable more efficient and coordinated use of geographic information across the organization and its agencies. The framing of integration is completely material; more, it is required and it ought to work together better to enhance overall efficiency.

However, Dorn has argued just recently that "unfortunately, the technological revolution as barely touched the Peace Operations of

the United Nations" (Dorn 2011:1). This is set against the Currion's statements, quoted at the beginning of this chapter, arguing that the Brahimi Report opened the floodgates of GIS use in the humanitarian sector. These opposing observations complicate the picture of technological adoption to enhance effectiveness and coordination. It demands an exploration of the extent to which GIS is integrated, used and what impact it has. However, this task is not aided by a mere material assessment of the status quo. Rational choice approaches do not, as the constructivist approaches, explicitly unearth why integration may or may not be difficult in relation to how it is understood. Constructivist approaches focus on understanding the different professional cultures and shared understandings as a way into accounting for, and explaining, the process of integration.

Constructivist perspectives have been effective in not only highlighting the failures of Peace Operations but have also pointed out the penalizing effects on the local populations. Spurred by the argument that there is a difference in the conception of peace between interveners and the population, this has produced within Peace Operations practice a greater emphasis, at least in discourse, on the necessity of adapting to local contexts. Furthermore, and critical to the argument of this thesis, some constructivist approaches have begun to highlight that not only are there differences in adaptation of the Liberal Peace as a framework amongst organizations but there are important differences between professional cultures. In other words, the group of 'interveners' is not homogenous. There is a complex assemblage at work made up of different professional cultures. While moves towards understanding the local are fundamentally important for teasing out conceptions of peace, Autesserre's notion that Peace Operations practices operate on and are influenced by circulating heterogeneous shared understandings poses important questions about GIS use.

Autesserre's emphasis on professional cultures combined with Rubinstein's notion of 'interoperability' poses an interesting question about the use of technology in Peace Operations and particularly mapping technology. It highlights the current absence of the voices of those 'delivering', 'implementing' or 'executing' Peace Operations and specifically those who produce spatial knowledge through mapping. The scholarly debate in other words is one amongst architects, focusing on architecture. It focuses on what the state should look like rather than how to build it. I argue that it is necessary to also focus on the builders and contractors and the implementation but not isolated from the political discourses. This thesis seeks to make this contribution by focusing on the voices of the mapmakers, of the GIS practitioners in order to explore their understanding of their work and how this work relates to Peace Operations.

GIS, Space and Logistics

This emphasis on logistics also requires further unpacking. A large part of the rational choice literature and the constructivist literature views logistics as either merely a technical matter, and thus an afterthought, or completely ignores it. Particularly, the paradigmatic discussions on Peace Operations, as either liberal or 'post-liberal' do not pay much attention to questions of logistics. While Dodge's call for more resources as a way to approach the failures of state-building represents a nod to logistical efforts, it is still framed as a question of efficiency rather than having its own conditions of possibility, its own 'professional culture', and internal modus operandi. Logistics is a mere extension of the shared understanding of the Liberal Peace, considered only as an afterthought or indeed completely ignored. Logistics is framed as ontic, a mere matter of available materialities, not with its own noteworthy conditions of possibility. What however will we learn by shifting the focus from design to implementation and

investigate the professional culture(s) of GIS practitioners and how it or they relate to other cultures with whom they interact; i.e. their clients for whom they produce maps?

In the spirit of Auteserre's probing to what extent this Liberal Peace consensus is actually shared and moreover practiced, I reframe GIS as spatial logistics in order to separate it out as a mere tool or material extension of Peace Operations. This emphasis allows an investigation of the 'professional culture' of GIS practitioners and their relationship to and 'interoperability' with their clients for whom they map and produce spatial knowledge; whether they be military staff or staff from civilian and political branches. It is important to note that for the purpose of this investigation I talk about logistics from the perspective of mapping. While there is a certain salience to logistics, it is still constituted by heterogeneous sets of practices of which mapping is one. Therefore, two imperatives arise: First, we must pay attention to all the ways in which logistics is differentiated from politics while second, keeping in mind that mapping represents the vantage point from which logistics is viewed. This thesis embarks on an examination of mapping in Peace Operations which is conjures up the problematic relationship between politics and logistics. Thus, whatever we can say about this relationship is firmly rooted in our investigation of mapping. Having clarified the relationship between mapping and logistics, it is nonetheless useful to briefly set out some background on logistics more broadly in order to contextualise mapping.

The term logistics, first used by Henri Jomini, is usually associated with war and military affairs, used by the United States during WWI. In relation to war, Junior and Duarte define it as "all activities in war that are pre-conditional to the use of the fighting force. It is the condition of possibility for the conduct of war" (Proença and Duarte

2005:645 – 646). From French from *logistique* art of calculating and from *logos* reason, according to the Merriam Webster dictionary has three interrelated definitions: Firstly, logistics are the things that must be done to plan and organize a complicated activity or event that involves many people. Secondly, it represents the aspect of military science dealing with procurement, maintenance, and transportation of military material, facilities and personnel. Finally, it denotes the handling of the details of an operation (Merriam-Webster Dictionary, accessed 2013). These definitions demonstrate that logistics represents a huge range of socio-material processes with their own underlying sense-making and logics at play.

Yet, Logistics has received hardly any attention in the context of politics with Cowen's recent work representing an exception. She demonstrates that logistics, in the context of globalized production and trade for example, exerts a shaping force reconstituting labour force, citizenship and space beyond national borders (2010). As she argues in her forthcoming book (2014), this power to reconstitute renders logistics deeply political. The securing of the supply chain, which ensures the maintenance of the circulation of goods, is a matter of national security with violent effects. Albeit a different context, Cowen's work highlights that paying attention to logistics conceptually and in practice terms represents a powerful new avenue for understanding politics.

Following through on acknowledging the specificity of practices, the transferral of this definition of logistics into the spatial logistics context of mapping then means to ask what elements – human and material – have to work together competently in order to achieve a particular aim. The management of an operation is a dynamic process. It is not a mere linear execution. It also demonstrates that the whole machinery needs to understand the objective of an

operation in the first place. As a consequence, it raises questions about how this objective is communicated by the architects, i.e. the clients, and how it is translated by the contractors, i.e. the GIS practitioners. How does the specificity of GIS mapping work translate into the set purpose, project or policy of their clients? And vice versa, how does the specificity of a purpose, project or policy translate into a GIS map? This opens up spaces for interpretation. It means that GIS use requires work and production the outcome of which is not *a priori* settled. Logistics is not just about materialities and the right amount of them being in the right place, just as much as technology is by no means something merely technological (Heidegger 1977). Framing GIS as spatial logistics necessarily poses the question of its exterting force. It opens up an avenue to investigate how it is negotiated and practiced, and how it shapes and 'orients' Peace Operations.

GIS use has some specificity to it: Shared understandings in GIS are bound up in but not only defined by representational practices by producing maps; spatial practices, in that it not only happens in space (as every other activity) but also relies on a particular understanding and production of space; and finally technological practices, as it requires engagement with hard-and soft-ware. The next section further unpacks these themes of maps, space and technology. As stated previously, the IR and peace and conflict studies literatures do not pay much attention to them while critical geography and cartography as well as science and technology studies explicitly examine their political dimensions.

Space and Maps, Producing Imaginations

The operationalization of Peace Operations, particularly the spatial execution has not received much attention in the literature. The spatial (and temporal) performative dimensions of missions have not received much attention. And yet, there is an architecture to state-

building, an inexplicit spatial plan. The definition of spatial planning raises thus far unexamined questions for Peace Operations practice which reach beyond the conceptual engagement or a discussion on approaches, by literally rooting these in the ground: The European regional/spatial planning charter states that it

> "give[s] geographical expression to the economic, social, cultural and ecological policies of a society. It is at the same time a scientific discipline, an administrative technique, and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and physical organization of space according to an overall strategy" (Torremolinos Charter, 1983).

What is the spatial planning of Peace Operations and how do they work? What assumptions are made about space and how do they impact planning?

Space as either a mode of analysis or as conceptual object of research is not only under-examined in PCS but also used to be largely ignored in the discipline of IR. This is particularly relevant in relation to the state. Although the discourse had been engaging with the question of the 'persistence or obsolescence' of the territorial state particularly in the context of globalization for quite some time (Hoffmann 1966; Ruggie 1993; Agnew 1994, 1995) orthodox IR broadly accepted this spatial ontology of the state as *a priori*. This was a point of contention in disciplines such as geography. IR does not have a rich history of engaging with space. With the proliferation of the Westphalian system in the post-WWII era and the emergence of the United Nations, legitimate membership of the international community is entirely defined by the existence of sovereign territorial states (Glick Schiller and Fouron 2001). The United Nations charter states that the institution "is based on the principle of the sovereign equality of all its members" (United Nations Charter, Chapter I, Art. 2.1). From issues of development to security to human rights to international

law to peace, politics is still largely defined within the confines of the spatial ontology of territory. In more concrete terms then, state-building, (described above as the fixing of weak and/or failed states through institution- and civil society-building and border maintenance), represents the recipe for generating and maintaining the conditions for positive progress.

Yet, Ruggie describes this discourse as "never looking at the ground one is walking on" (1993:174). IR as a discipline is only beginning to move beyond an analysis of politics underwritten by an orthodox conceptualization of space. Space requires a richer conceptualization than being a mere fixed physicality, a stage on which history unfolds. Indeed, this separation between time and space, in which the former is prioritized over the latter, is lamented by geography scholars of the 'Spatial Turn' from the 1960s and 1970s onwards. Initially scholars such as Lefebvre and Foucault (and more recently Edward Soja, Nigel Thrift, Doreen Massey and Stuart Elden) not only break with the positivist concept of space as mere fixed physicality but seek to bring it back to life. Elden's work on territory for instance conceptualizes it as political economy, political strategy, calculation, and as political technology which illuminates the complexity of the concept of territory itself. This kind of work highlights space as process, practice, and production, rather than as a mere stage for history (Sack 1986; for a general history of the concept of territory see Brenner and Elden 2009; Elden 2013).

Lefebvre's trialectics of space seek to capture its multidimensionality, as it is perceived through our senses, conceived of through maps or art for example and lived, physically and emotionally (Soja 1996; Lefebvre 2007). Emphasizing its relativity, relationality, its production, process and experience of space make space fundamentally part and parcel of history and of politics. Politics then

is not merely invested in a carved up spatial unit of the state for example but is always already intertwined with space and in motion. Through the richness of critical geography and cartography the following questions can be pursued which give further specificity to the shared understanding circulating in GIS mapping: first, what is the status of this modernist spatial ontology underlying territory and represented in cartography in state-building? And second, what role does it play in the spatial logistics of state-building broadly and in relation to GIS specifically?

Indeed, the role of maps as a representational conception of space is therefore interesting. What is the productive or constrictive role of maps in conceptualizing and imagining space? How do maps relate to the modernist spatial ontology? What effects do they have in the context of Peace Operations and their political mandates? And yet again maps and mapping as an activity is largely absent from peace and conflict studies and IR. While literature on the role of cartographic representation and practice abounds in cartography and in (critical) geography, only recently has the work maps do been taken up seriously in IR. Branch for example shows how the emergence of cartographic practice enabled and significantly contributed to early modern European state-formation. Using France as a case study, he shows for example how its centralization and thus constitution as a bordered homogenous state-space was bound up in its mapping (Branch 2011). In addition to this bounding of the state which Strandsbjerg also emphasizes via the example of Denmark, he moreover demonstrates the importance of cartographic practices in making possible the imagination of the state in the first place (Strandsbjerg 2010). Being able to think about the world as made up of spatial boxes, representing the legitimate political actors is bound up in the representational practices of cartography. This historical perspective demonstrates that cartography manifested the

spatial imagination of the state. Indeed, to this day the map and its representation of the world as constituted by states, has become normalized to the point where questioning its spatial assumptions and production process seems beyond the imaginable.

Taking Branch's examination of the political history of the map and its role in producing political space as a jumping off point, we can begin to raise questions about the implications of modern spatial technologies such as GIS in and for politics. How do these challenge or maintain spatial imaginations? How does GIS frame or alter the production of space? How is space imagined and made? How is spatial knowledge of (post-) conflict countries produced and through what rationale? Or simply put, how do practitioners know where anything is? How do they make decisions on where things should go, or what it should look like? Answering these questions requires an in-depth look at how GIS is used to visualize (post-)conflict spaces and how GIS practitioners understand the execution of the political project that is building the state for peace. The investigation of the role of GIS in Peace Operations, its involvement in state-building, represents an important task, which represents an attempt to fill this disciplinary lacuna in IR. Moreover, given the longevity of the study on maps in critical cartography studies and the more recent critical GIS studies, this thesis draws on its expertise (chapter 2 sets out this literature).

Technology and Politics

While the map is a powerful visual output of GIS, as a system, it is also a technology. Specifically, it is an information management system, which includes many elements and comes with its own material complexities and limits. Technology is beginning to attract more attention in IR. This is for example demonstrated by the newly created International Studies Association Section called Science,

Technology and Art in International Relations (STAIR) due to be launched in 2014. This is partly due to the growing interest in the role and impact of technology in critical security studies (see for example chapter 10 in Peoples and Vaughan-Williams 2010). Yet, while technology is featured in narratives of globalization as space-time compressing (see for example Harvey 1995, 2005), thus fundamentally changing the environment in which politics takes place, they are not intrinsic to the discourse of IR.

In IR, technology is considered as "the great residual - that is external to politics" (Herrera 2003:560). This is what Herrera calls the "technology-politics dilemma" (2003:576). The importance of technology is acknowledged by burgeoning questions about the digital, and emergences, such as big data. However, politics and technology are not thought of together, not thought of as technological politics. A technological theory of international relations in which technology receives equal attention is yet to be developed. This separation between technology and politics echoes the rational choice literature on Peace Operations, which sees logistics as a mere question of good choices or bad choices to be made. The new ISA section seeks to rectify this lacuna:

> "Science, technology, and design are at the core of global politics. They now shape much of the everyday reality of international security, statecraft, development, design of cutting-edge military ware, and global governance. Science, technology and design or art (i.e., in the form of cultural industries, computer software and videogames, architecture of spaces and urban flows) permeate international affairs in the form of material elements and networks, technical instruments, systems of knowledge and scientific practices, to the extent that they challenge most existing conceptual approaches. Yet, IR as a discipline and field has sporadically engaged these matters, or in existing communities in other subsections that seldom communicate with each other" (ISA STAIR Section Proposal , December 2013).

In peace and conflict studies, particularly the critical branch with an emancipatory agenda, there is hardly reference to technology at all. The academy has not paid much attention to the technological ways in which Peace Operations function or how that profession understands and relates to their political masters. This is different from investigating its approaches as top-down versus bottom-up for example. Looking at the technologies employed, how they are negotiated in use, what effects they have, and what kind of shared understandings they bare, has been largely unexplored. And yet in the more practitioner-oriented discourse, technologies, particularly of the Information and Communication Technologies (ICT) type are garnering interest. For example, the United States Institute for Peace (USIP) launched a roundtable initiative in 2011 on Science, Technology and Peacebuilding (USIP, accessed 2013). Meeting twice annually, the institute seeks to bring together technology experts, practitioners and stakeholders in order to understand and harness the potential of using technology in peace-building.

The ICT4Peace Foundation also supports this agenda of greater technological integration and competent use (ICT4Peace Foundation, accessed 2013). Walter Dorn, Professor of Defence Studies at the Royal Military College of Canada and the Canadian Forces College, is one of the rare scholars who is concerned with issues of technology applications in UN Peace Operations. Having served for a number of years as a consultant to the UN, his work focuses on how new technologies, particularly monitoring technologies can aid in improving UN Peace Operations (See for example Dorn 2011). However, this work is again more rationalist centered rather than looking at the problem of technological integration from a more sociological perspective as this thesis does. It does not account for how understanding technology plays a role in its use.

However, this lacuna of thinking about technology in either IR or Peace Operations creates an impetus to turn to the home of science and technology studies. For a long time the study of technology has mostly focused on its effects as either technologically or socially determinist (Herrera 2003:567). "[L]ike a force of nature, the digital age cannot be denied or stopped" (Negroponte 1995:229). In GIS terms, Dobson states that digital mapping technology represents the inevitable "beginning stage of a technological, scientific, and intellectual revolution" (Dobson 1993). Another perspective lessons the technological determinism, not seeing technology as something merely material and natural that is "determin[ing] history" (Williams 1994:218) but as also fundamentally social and thus an activity (Sismondo 2010:57). From this perspective, "technology is either shaped by economic and big government/military concern or it is more or less out of control for everybody" (Sørensen 2004:184).

While technological determinism and its functionalist branches do not represent a dominant school of thought in the academy any longer, the belief in the integral potential of GIS as technology set out in the Brahimi Report mirrors this technological determinist stance. It is one in which the logic goes as follows: the task is to understand what this technology can do for Peace Operations, rather than what can *we* do with the technology within UN Peace Operations. Its potential is somewhat seen as integral, missing the sociological context in which technologies are taken up, understood and applied. Thus, in science and technology studies technological determinism has been largely displaced by a constructivist point of view. As Sismondo argues, constructivism in STS is not a homogenous school of thought but ties together a variety of approaches which emphasize the social and activity aspect from different angles (Sismondo 2010:57).

From the constructionist point of view, the effects of technology are "not (just) a function of the technically feasible, not the product of some inevitable technological trajectory" (Herrera 2003:572). Rather, it is its 'success which determines the functionality of technology' (Schulz-Schaeffer, Böschen, Gläser, Meister, and Strübing 2006:2). Success is not innate but has to be achieved. Thus from the STRONG Programme (Bloor 1976) to the Empirical Programme of Relativism (EPOR) (Collins 1981) to Laboratory Studies (Latour and Woolgar 1979; Knorr-Cetina 1984), the production and process involved in science and technology are increasingly emphasized. Technology could not be studied as a naturalized artefact but requires that it be situated into the context of its design and use. Applying this perspective to GIS then means not to study it as an abstract material technology but to account for and examine the social context in which it is used. As Schulz-Schaeffer et al argue, "constructivism has become the overarching scientific paradigm in the social study of science and technology (STS)" (2006:3). Indeed, "the technology-politics issue renders itself fruitfully to be pursued by constructivist approaches" (Sørensen 2004:185).

The latter here underwrites the framing of GIS as spatial logistics in the sense that an investigation of its application and use opens up spaces of its material and inter-subjective negotiation and translation of its purpose. This is held together or dissipates dependent upon the extent to which the understanding of what GIS is and does is shared. It quite literally requires an understanding of its working in order to say anything meaningful about its role and use. GIS as a technology is used by professional practitioners trained in its logics, tapping into a specific set of expertise giving meaning to the technology. Yet, neither the technology nor practitioners using it, operate in isolation. In the context of UN Peace Operations the use of GIS is geared towards clients for whom maps are produced. Linking back to

Autesserre's professional cultures brings to light two interacting communities between the use of GIS has to be negotiated – mappers and clients. It is in this interaction that GIS gains meaning.

Therefore, the technology cannot be studied in its ontic sense, that is, in its mere materiality. Constructivist approaches aim to problematize the ontological security allocated to the meaning of technology. The point here is not to introduce a particular approach to investigate GIS; that would be premature. Rather the overview provided aims to situate the problem of GIS use theoretically and set out the theoretical trajectory of investigation this thesis embarks on: on the one hand to take its materiality seriously while on the other not allowing it to determine the meaning of GIS use in the first instance. In sum, what comes out of this overview is that in order to account for the role of technology, in this case GIS technology, one must account for its system in motion. That is, the production of spatial knowledge, the practitioners involved in these processes, the users, as well as the materials as component parts of this system.

GIS in UN Peace Operations – What is at stake?

Thus far, I have put significant emphasis on the negotiation of culture and materiality, specifically on how shared understandings underwrite GIS in terms of space, maps, and technology. An analysis of the professional cultures interwoven with these themes fits with Rubenstein's anthropological agenda of comparing professional cultures and how they 'inter-operate' and would align with a constructivist organizational analysis, extending Barnett and Finnemore's work (2004). The questions pursued in this thesis are: How is GIS understood, to what extent is this understanding shared between professional communities (GIS practitioners and users) and how does this as a consequence 'orient' Peace Operations?

But what is at stake in the 'orientation' of Peace Operations? As outlined in the section on understanding Peace Operations, I demonstrated that the literature has been particularly concerned with the political effects of missions in two ways. First, the liberal progressives see that the problems missions have faced in the past can be addressed by adjusting implementation methods allowing for better coordination. Second, critics have argued that it is in fact the political agenda of the Liberal Peace as well as its methods, which render missions operating within a neo-colonial framework. Only by looking for alternative politics (i.e. the local) can these grievances be addressed. Integrating GIS into this binary assessment of Peace Operations then would suggest that as a technology, it works to either enable sustainable peace, or put bluntly, propagate empire.

Connecting this with some assessments of technology more broadly, Sørensen argues that "academic efforts to show that technology has politics have usually meant harmful politics" (2004:185). While this is a "necessary corrective" to the ubiquitous blind belief in the inherent progress technological advancement delivers (Ibid), it renders the study of the politics of technology almost *a priori* binary. While this binary set-up represents a schematic reflection of the rich literature on Peace Operations, it serves to challenge how to situate an examination of GIS. This thesis seeks to explore the specific context in which GIS meaning is produced without losing sight of the potential political effects of missions outlined in the literatures. Therefore, this thesis is instructed by a guiding question: "How may we engage both constructively and critically with new technologies?" (Sørensen 2004:186)

Sørensen and the other authors of this special issue understand the answer to this question to lie in simultaneously accounting for the positive and negative potential of technologies, in order to "strike a

balance" (Ibid). Thus, focusing on "interpretation, identity and communication" begins to pave the way to what they call 'a cultural politics of technology' (Ibid.). While this aligns with the focus on relations of 'professional cultures' or indeed epistemic communities as outlined above, Sørensen distinguishes between technology policy, i.e. the regulation of technology through policy, and the "concrete politics of designing technology" (2004:187). However, since there is no literature on GIS use, integration or organization within the institutional context of the United Nations or in the political project of building peace, these distinctions are not useful. In other words, rather than prefiguring categories of organization, such as looking for the regulation of GIS via policy articulation, I place emphasis on the everyday work through which the order and organization of GIS emerges and in which meaning and understanding is constantly produced in interaction.

For this research project, posing the question of what is at stake in the use of GIS in Peace Operations requires striking a balance. While it focuses on how GIS use is understood and negotiated in the everyday between practitioners and users, it still takes seriously its potential political effects. However, instead of aligning these effects with the kind of politics set out in the literature on Peace Operations, as either liberal progressive or neo-colonialist, it hones in on the cultural and epistemic production of GIS meaning. This means that I set out to be sighted, constructively and critically, on the political effects which are produced in the practices of mapping.

The implications of such a stance for this project are represented by an impetus to uncover nuance in thus far closed off categories, particularly 'the liberal'. In relation to the politics of Peace Operations, Chandler argues:

> "The analytical focus on the 'local' and upon 'hidden agency' naturalizes the understanding that the limits to peace are located at the local level and are internally generated or reproduced through local ways of life or modes of being which are understood as 'resistant' to external 'liberal' forms of compliance" (Chandler 2013:31).

Here he points to another binary, in which the local opposes the liberal and in which the former holds the possibility to imagine a different kind of politics. The local represents the path to emancipation. 'Liberal forms of compliance' on the other hand suggests liberalism as a consensual governing paradigm. In other words, the politics of Peace Operations focuses on the building and proliferation of a liberal order, which is agreed upon by its architects. Following Chandler's terms, a move towards the local forecloses any kind of possibility of difference or salience of peace to emanate from the liberal. The 'liberal' is homogenous and externalized. While an on-going debate focuses on the ontological constitution of hybrid forms of peace and how exactly the liberal and the local relate to one another – with some fearing that that might just reify the binary – the focus remains largely on the local.

The politics of the liberal as one entity is devoid of difference, its politics is a foregone conclusion and its judgement within the academy is then merely based on its effects, as necessarily progressive or oppressive. Reintroducing GIS into this equation would then mean that it is subsumed as either a tool to aid in the project's efficiency or as a tool to operationalize the hegemonic machinery that is the Liberal Peace. It renders GIS as a mere operationalizing tool of the 'peace-building consensus' denying it any specificity. Thus, subsuming GIS into the discourse on Peace Operations per se would deprive it of a possibility of its own politics in relation to Peace Operations and thus also gloss over any possibility for difference. Understanding GIS use in this specific context and rejecting its

subsumed status into what has been deemed the politics of Peace Operations then also means to open up 'the liberal.'

Introducing a constructivist lens via a recognition that 'the liberal machinery' is also made up of different professional cultures opens up the category of 'the liberal', and as a consequence puts its politics at stake anew. Is difference only to be found 'external' to the liberal? What about frontline practitioners? What about logistics specialists? What about the builders? How do they understand and interact with the architects?

Unearthing nuance then means to understand how politics is made. It means to understand struggles in which GIS use is negotiated, processes in which it is thought of otherwise. Of concern is how mapping is understood, and how this understanding influences its enactment and organization. Politics is the process in which possibilities emerge or are cut off. In other words, politics is the opening and foreclosing of the possibility of difference. Investigating GIS use by examining the shared understanding(s), which circulate through the mapping community, and their 'interoperability' with other professional communities within Peace Operations discloses the terrain in which politics is made. It discloses the field in which GIS mapping is practiced, made sense of, organized and used. It opens up spaces in which opening and foreclosing occurs.

It is not just a question of what GIS technology does to Peace Operations. It is not just about accounting for and explaining possible effects. Instead, the question is how it co-constitutes the politics of Peace Operations contributing through negotiated and relational specificity to their 'orientation', the process in which possibilities emerge and disappear. The question then is what is at stake in the shared understanding underlying GIS use? GIS use and

the effects it produces are contingent upon these contextualized struggles interwoven by shared and possibly clashing understanding. This conceptualization of politics is about identifying spaces of production, not merely following the "liberal aim of consensual politics, homogenizing difference" but "as 'antithetical' by allowing for 'difference'" (Mouffe 2005:13, 14).

Returning to Sørensen, this politics as struggle in which possibilities of difference are situated, aligns with his cultural politics: "to talk about the cultural politics of technology may provide a needed correction to the perception that the world of technology is mainly an instrumental affair" (Sørensen 2004:188). Indeed, looking at the translation and negotiation processes, and doing so as this thesis intends to do through the prism of everyday interactions, highlights "contingencies" and the "work" that needs to be done to communicate technology (Sørensen 2004:189). In this sense progress or oppression is never a foregone conclusion. The meaning of GIS use and its situation within Peace Operations is a matter of material and intersubjective negotiation across professional cultures.

Aims, Contributions, and Research Questions

The purpose of this thesis is to investigate GIS mapping by constantly weaving together the inter-disciplinary background explored in this introduction. It fills bits of the lacuna by drawing in expertise from other disciplines, such as critical geography and cartography. Thus, the aims and contributions of this thesis first and foremost flow from addressing the silences in the literature. As GIS mapping in the context of Peace Operations is so under-researched, the work of this thesis is continuously unpacking this object of analysis empirically and theoretically. Empirically, it unpacks logistics, spatial logistics and GIS mapping in Peace Operations, narrowing down questions: What do we learn by looking at the implementation rather than the

architecture? How does the spatial performance of Peace Operations work and how does anybody know where anything is? How does GIS mapping work and how does it produce spatial knowledge? How is that spatial knowledge used?

Theoretically, the themes surrounding these problems, such as technology, space, mapping and Peace Operations, have not been brought together and at times even individually represent narrow engagement in IR or PCS. Indeed, the way in which Peace Operations have been studied subsumes logistics into the political project as merely that which operationalizes it. In this narrative, the politics of Peace Operations are framed by its architecture and recipe on the one hand or by its progressiveness and the efficiency of its implementation on the other. The implementation itself however does not receive much attention on its own terms. The limits of possibility are defined by the political project and are not considered co-constituted by its logistics.

This lack of engagement with the logistics of Peace Operations, the lacuna of alternative conceptualizations of space, and conceptualizations of technology in Peace Operations, requires an innovative and interdisciplinary framing. This thesis seeks to tease out the spatial logistics of GIS in relation to Peace Operations which it ought to serve. This brief literature review has already outlined the rich resources useful to the endeavour of this thesis: critical geography and cartography and GIS studies aid in understanding space and studying maps. Social constructivist branches in STS highlight and underwrite the impetus to study process and production. They emphasize the necessity of paying attention to the social actors as well as the materialities involved. Thus, this project draws from these literatures without completely adopting them. They

represent the frame within which I develop and flesh out a customized practice approach.

In this introduction I have raised a variety of questions. This was necessary in order to contextualize and narrow down the complex problem I investigate as well as begin to set out how to substantiate my argument. For the sake of clarity I here spell out explicitly the set of research questions the following chapters address and answer:

I. How do understandings of GIS mediate mapping practice in the field operations and its institutional organization?

II. What is the professional culture of GIS practitioners, and how do the understandings underpinning this culture relate to the culture of mapping clients? Are they interoperable?

III. How can we understand the implications of thinking of politics and logistics together?

Thesis Overview

This thesis is comprised of seven chapters of which this introduction is the first. In chapter 2, I turn to outline how maps broadly and GIS maps specifically, have been studied in the cartographic and GIS literature. It represents the theoretical background and framing for the examination of GIS. Of particular concern is the map as a political artefact, i.e. that its representation has effects on and in the world, shaping the spatial imagination constantly, and producing worlds. Echoing the impetus set out earlier to think politics and technology together in a non-deterministic frame, the chapter seeks to break down how the relationship between the map as artefact and its effects have been conceptualized. It shows how in both cartography and GIS studies a similar move towards post-

representation can be observed. This shift is characterized by an opening up of the map as a bounded and integral object of investigation to account for the elements which make up its production and use. This is not just a material breaking up of the map but emphasizes the importance of including cartographers and GIS practitioners into the study of maps, thereby foregrounding the social context in which it is used without neglecting its materiality. Indeed it shows how studying maps must always also mean studying the practice of mapping. This emphasis on material *and* social processes challenges the ontological security of the map. It begins to set out mapping *as a practice*. From this practice perspective, I resituate politics from intrinsic to the representation and technology to the processes which make it up. It is therefore congruent with investigating the political effects of GIS use as *contingent* on its material production and intersubjective negotiation.

Chapter 3 sets out the methodology for this project. It tells the story of my fieldwork; particularly how the GIS mapping sites I visited emerged. Moreover, by picking up on the theoretical framing of mapping as practice, I draw on practice theoretical literature to provide greater theoretical specificity to what it means to apply a practice lens as well as set out its methodological implications. The chapter explains my ontological and epistemological stances following from a post-positivist, interpretive approach. It outlines the methods I used to operationalize an investigation of mapping as practice, using participant observation and qualitative semi-structured interviews. And finally I reflect on my own positionality vis-à-vis this project, my research participants as well as the generated data. These sections are informed by Sørensen's balance of engaging with technology simultaneously constructively and critically. In this sense, the chapter functions not only as a commentary to the project by explaining how it came to be and how it was executed; it also

functions as an important evaluation framework, as it sets out the criteria providing the rationale and rigour of this project.

Following the theoretical and methodological framing of mapping as practice set out in chapters 2 and 3, the empirical investigation of GIS ensues in chapters 4, 5, and 6. All three chapters represent an encounter with mapping and its mapmakers in their everyday world. They work to illustrate the constitution and negotitation of an epistemological fault between mappers and their clients. The fault is manifest in two ways: First, in its representational politics (the world is (not) the map) and second, in the separation of politics and logistics (mapping is (not) a political practice).

Chapter 4 gives an analysis of my first encounter with GIS mapping in the Peace Operation environment in Timor-Leste. Since there is hardly any academic literature on GIS use in Peace Operations to date, it represents a first account of the role of maps, mappers and users in the field. As such, it functions first and foremost as a problematization of the assumption that GIS mapping is a) integrated and b) works efficiently to serve the political project of state-building. Engaging with GIS practitioners and their clients demonstrates that these two professional communities understand mapping differently. GIS practitioners understand the map as a product of a series of – at times fluid – political decisions. Their clients more often than not understand the map as a factual image of the world.

By summoning the critical geography and cartography literature, I tease out and analyze the normalizing role of the modernist ontology of space, i.e. the cartographic imagination, in envisioning state-building. The map, here enshrining this imagination, is merely a visual aid to operationalize political projects. Professional communities have to negotiate an epistemological fault of two

dimensions: The map as political model on the one hand and as factual image on the other; and mapping as political or a-political logistics practice. I argue that it is the understanding of these relationships, the traversing of the epistemological fault through translation and negotiation between GIS practitioners and their clients, which gives meaning to GIS use in Peace Operations.

Chapter 5 hones in on the professional culture of mappers more closely and the extent to which there is a possibility for interoperability with their clients. Engaging with GIS practitioners in their everyday work demonstrates how they understand the politics of representation and the political nature of mapping as a practice. By following the example of the production of a topographic map, I illustrate the complex ways in which mappers have to engage with technology and one another to *produce* a competent performance. In this performance, decisions, the application of standards and rules, and the interpretation of the meaning of mapping are always at stake and not settled. These socio-material negotiations represent the terrain from which they engage with their client communities.

It further examines the constitution of the epistemological fault, how it is traversed and examines the implications. Their clients operate in different epistemological registers, thus the transfer of knowledge and the production of meaning is contingent upon the movement from one register into another. The chapter demonstrates that GIS mapping rather than a technology standing as reserve, enabling political projects, requires work. Materially and inter-subjectively mapping depends on how the political and logistical identities of GIS are navigated, and how the different communities of practice are able, through communication, to achieve 'inter-operability' where understanding is shared.

The final empirical chapter (6) demonstrates how this epistemological fault is also reflected in the institutional organization of GIS within the UN. It teases out the problematic and unsettled relationship between GIS mapping as a-political technological logistics and the political projects of mapping clients. Chapter 6 gives an account of the history of mapping at the UN as constructed by cartographers themselves, in which mapping holds an ambiguous identity and a fluid institutional location. Moreover, it looks at the current architecture of GIS mapping sites and how they relate to one another. Rather than attributing meaning to the UN GIS structure, applying a practice perspective allows for an account of how GIS practitioners understand this structure and through their own practices contribute to the constitution and contestation of GIS organization in their everyday. It is this everyday practice which organizes and re-organizes the tenuous relationship between a given political project and logistics.

This means that while the epistemological fault influences the institutional organization of GIS within the UN institution, the fault is in itself not structural. Its politics are not *a priori* determined. The practices of the practitioners enable or obstruct their traversing the fault. Traversing the fault means mappers and clients can approach each other across the fault and learn from one another. It is therefore the extent to which the competing understandings of mapping are translated and negotiated which gives meaning to GIS use. Again, the chapter aims to problematize the notion that GIS works to serve political projects by showing that the organization of mapping is contingent and dependent on how GIS is understood. It ends with the suggestion that to comprehend what these different understandings mean and how they come together in interaction, opens up further spaces of contingency.

Chapter 7 concludes the investigation of GIS mapping in UN Peace Operations. It summarizes and synthesizes the key findings of the thesis, capturing the empirical and theoretical journey. I rehearse and investigate the implications of setting the representational politics of the map in motion, reframing it as contingent on the practice of the epistemological fault. Indeed, this has implications for how the political effects of Peace Operations are understood, where they are rooted and how they can be addressed, remedied or propelled. In this vein, the chapter also reflects on the research process, outlining the merits and future contributions a practice-based methodology can make not only to IR, but more broadly to struggles in inter-disciplinary research. Finally, returning to Sørensen and his call to engage with technology critically and constructively, it draws out the consequences of taking the co-constitution of politics and logistics seriously. It sketches out what kind of research agenda emerges and how this approach challenges current assumptions and ways of thinking.

2 The Politics of the Map: Towards Map(ping) as Practice

Not only is it easy to lie with maps, it's essential.

(Monmonier 1996:1)

Maps are commonplace. They are in classrooms, living rooms, offices and halls of power. Throughout history they represented spaces, depicting the world we live in. Yet, they are so normalized that they are taken for granted. Take the example from the West Wing transcribed in the prologue to this thesis: CJ is shocked to learn that the world map is a product with particular qualities which have effects on the world and thus impact the way in which we understand it. Not only are Germany and France not where she thought they were but the notion that the representation is alterable – the notion that this is not the world, à la: ceci n'est pas une pipe – fundamentally rocks her sense of orientation. When we look at a map we do not see the process through which it came to be or the work and effects it has on the world. We see the depiction. We see the world. Our imagination of the world is fundamentally intertwined with its mapped representation.

Maps are, however, political artefacts that make the world visible in particular ways, which influences the way in which we understand and navigate it. As Monmonier points out, maps lie. They are "graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes or events in the human world" (Harley and Woodward 1987:xvi). The representation is not the truth however; it is not the 'mirror of nature' as Rorty would put it. Instead it is alterable albeit given certain scientific rules. The science of

cartography and GIS has a particular historicity in terms of how its understanding, norms and rules have come to be constituted but also a history in terms of their involvement and role in the world. Given that international relations has largely been silent on the role and effects of maps and that GIS is being adopted in order to produce spatial knowledge for the purpose of building peace, their role, occurrences, implications and projections in history and politics require illumination.

There is an abundance of interesting literature on maps. The guiding rationale for surveying and synthesizing this literature, which covers several disciplines, most notably (critical) cartography/geography, and GIS studies is the following: Given the inter-disciplinary audience at whom this thesis is directed, this chapter functions as a sensitizing frame. It provides an orientation framework into which to situate questions such as the following are situated: What is the cartographic history and how has it been studied? What is at stake in the study of maps? Through these questions, this chapter seeks to provide some background which allows the reader to engage with the later empirical chapters. It represents a counter-point to the much-discussed politics of Peace Operations by emphasizing maps as a starting point.

However, this is only one function of this chapter. The literature presented here outlines the evolution of the study of maps moving from an analysis of its politics as represented in its artefact form towards gradually embracing elements of its practice. This move entails an opening up of the map's representational frame. It begins to account for the socio-material elements such as its production processes, its producers and users thereby opening new spaces of contingency and consequently politics. Providing this overview begins to outline the kind of specificity there is to mapping which flows into

but does not define the professional cultures of mapmakers. The second function is therefore theoretical and methodological in that it lays the groundwork for a conceptualization and empirical pursuit of mapping as post-representational practice (as set out methodologically in chapter three).

The chapter is divided into three parts: The first part outlines the cartographic revolution with its specific features, describing how it ushered in a transformation of spatial imagination of great magnitude, circumscribing the modern European territorial system. The second part sketches the evolution of the cartographic and GIS literature on how to study maps. It details the debate between those who herald the map as a vital tool of scientific progress and those who seek to account for its political effects. In the process of this debate, it can be observed how the representational frame – the map as an artefact – becomes gradually broken down. The third part, drawing attention to the capacity of its producers, its performance by its users and the spaces which are created in the process conceptualizes the map as practice, thereby problematizing the map as either purely scientific or as inherently inscribing a particular kind of politics. The purpose of this chapter is to provide a non-expert reader with a background on maps, to use the literature so as to develop mapping as practice theoretically and thus to give specificity to mapping 'culture'. This represents the lens through which the role of GIS in UN Peace Operations is read and analyzed, the methodology of which is set out in the next chapter.

The Cartographic Revolution and the Imagining of Territorial Space

"We have lived within the lines we have traced and been made the subjects we have become," (Pickles 2004:3).

In Western history, maps play a central role in imagining the world. The European Renaissance of the 15th century represents an anchor point for a significant transformation of spatial imagination moving from conceptualizing the world as a universal realm under God towards discrete spatial entities, over which power can be exercised. The carving up of space into either sovereign territories or imperial possessions inscribed political power spatially. And it is the emergence of cartography and its techniques, allowing for measurement, calculation and depiction, which are central to the possibility of this shift. A unique dialogue between the arts, science and philosophy made possible a conception of territory underwritten by homogenous space, possible to delimit and open to being cartographically mapped.

This territorial space represented a stark contrast to the medieval epoch where maps represented stories (Ingold 2000), "expressing various 'kinds' of knowledge" (Strandsbjerg 2010:75) in which space was conceived of as holistically "cosmological" (Biggs 1999); one realm under God, imbued with "religious superstition" (Strandsbjerg, 2010:75). Thus, maps are not novel to this period but have always existed in some form or other as ways of making sense of the cosmos and the place of humanity within it. This has a temporal dimension to it: by displaying for example, "the symbolic significance of places" such as "the Garden of Eden, [*as well as]* Paris, Rome and Jerusalem" (Strandsbjerg 2010a:75), it represents the story and

history of the divine order. It represents the conceptualization of the human natural and divine story, the origin, the centers of meaning and the divine ruling. In the *mappa mundi* for example, there were "no territorial divisions […], no signs of territorial demarcation" (Strandsbjerg 2010:75). Space here was not framed as a political possession but implicated in the understanding of a holistic cosmology. Indeed it is argued that space in the 'modern abstract' sense is "a postmedival category" (Elden 2005:16 quoting Zumthor).

Several important techniques, categorized as scientific, arose during the Renaissance period, which revolutionized the way in which space could be thought about, organized, navigated, and controlled. These are commensurate with a

> "shift from medieval to modern thinking from a holistic to a fragmented view of reality, from a mapping which sought to penetrate mystery of the whole universe beyond human boundaries to a mapping which is contained strictly within the frameworks of analytical thought and Euclidian geometry" (Scafi 1999:70).

What I will briefly introduce here is a sketch of this transformation. Within this space I am unable to do justice to the full fledged transformation of spatial imagination or provide an in-depth genealogy of sovereignty (see for example Bartelson 1995) or of territory (Elden 2009, 2013). The main themes covered are the conceptualization of space as homogenous, the possibility of its measurement and calculation and ultimately the importance of linearity to the possibility of imagining a particular order. It is these which bear space as an independent and "abstract" concept (Strandsbjerg 2010:77), characterising scientific mapping, and underlie the territorialisation of imagination so central to the modern conception of the discipline and practice of international relations.

Homogeneity

In Italian Renaissance painting for example, the single-point or linear perspective was developed in which "space is pictured from one vantage point shared with the viewer," (Biggs 1999:378). The organization of space, or the view on space, is focused on one point – vanishing point – towards which all other features are oriented and arranged along parallel lines. Being able to depict space according to linear relations is central to the single-point perspective. This technique presented a revolutionary way to depict space and arrange features; many paintings were commissioned by the church using this technique in order to depict God closer to Christians (Lebow 2009:224). The single-point perspective allowed for a "conception of the earth as having its surface organized by a grid system of longitudes and latitudes, so that all parts could be thought of in proportion to one another" (Edgerton 1975:111). Interestingly, as Biggs notes, the higher the view point in the single point perspective, "the closer the resemblance to the map" (Biggs 1999:377).

The emergence of Euclidean geometry is central to the possibility of this technique. It postulates the following axioms: the possibility to draw a straight line between two points, the possibility to always be able to extend a finite line, no restrictions on the size of a circle alluding to the continuity and infinity of space and finally, the possibility of constructing similar figures on all scales of magnitude (Walker 1993:129). Euclid's axioms engender the possibility to impose a grid onto space in order to make it knowable via measurement. This represents a central shift to the conception of space. Euclidean geometry, Capec argues, "expresses various aspects and consequences of one fundamental feature – the homogeneity of space" (quoted in Walker 1993:129). Space is an abstract independent concept, it is one entity and of one quality, allowing the universal imposition of measurement.

Calculation

This homogeneity is thus closely linked to the possibility of its calculation. Indeed, Elden argues that calculation, going back to Descartes, is the central feature for the possibility of territory and the modern "geographical determination" of the world" (2005:19). In Lefebvre's words, space is conceived "strictly [in terms of its] geometrical meaning. The idea it evoked was simply that of an empty area […] a mathematical [concept]" (1991:1). Calculation techniques had to be applied in order to measure latitude and longitude. The former was calculated via measuring "the angle of the height of the celestial bodies above the horizon: the sun and the polestar […. through which] it was possible to determine the distance from the equator" (Strandsbjerg 2010:79, 80) The latter, while at sea was difficult at the time due to the absence of clock-time, on land it was enabled by the technique of triangulation. It "calculate[s] distances mathematically by measuring angles between features in the landscape and relating them to a measured baseline" (Strandsbjerg 2010:80).

It is the advances in geometry which make possible the drawing of lines, partitioning, measuring distances and identifying locations. Indeed, particularly "locating human actions in space remains the greatest intellectual achievement of the map as a form of knowledge" (Harley and Laxton 2001:35). And as Elden states "there is an important link between mathematics and the political constituting of these boundaries," i.e. lines (2005:8). For Descartes, they represented the symbolic version of the world (2005:10). The map's political role is historically evident. The transformation entailed the departure "from medieval piecemeal to a single, universal system of measuring and representing the world that used perspectivism and Cartesian rationality, underpinned by notions of objectivity, functionality, and ordering" (Dodge, Kitchin, and Perkins 2011b:2). Implicated here is

the shift from the experiential understanding of space and the world of which the subject is a part to one in which *homo cogitans,* separate from the world employs science to master nature.

Linearity

Vested in this calculable homogeneity is the centrality of linearity. The single point perspective allows for the arrangement of objects towards a single vanishing point, creating a linear perspective towards one point. This linear vision has become a powerful metaphor for Western culture: On the one hand it allows for thinking about space as flat and divisible, permitting the drawing of lines and thus the calculation of relations. Pickles points out, "what is geography if it is not the drawing and interpreting of a line?" (2004:5). The world is subsumed by a universal grid of "intersecting straight lines – having become a geo-coded entity" (Pickles 2004). Elden elaborates how the straight line became preferable in terms of its "conceptual elegance" to 'natural boundaries' (2005:11). This preference is clearly apparent in the Treaty of Tordesdillas, as Elden points out, which presents the division of Spanish and Portuguese claims to the world:

> "A boundary or straight line be determined and drawn north and south, from pole to pole, on the said ocean sea [the Atlantic], from the Arctic to the Antarctic pole. This boundary or line shall be drawn straight, as aforesaid, at a distance of three hundred and seventy leagues west of the Cape Verde Islands, being calculated by degrees, or by any other manner as may be considered the best and readiest, provided the distance shall be no greater than above said" (Treaty of Tordesillas, 1494, Clause 1, quoted in Elden, 2005:11)

On the other, linearity alludes to the notion that there is a "normal path for human lives, institutions, and projects" (Lebow 2009:237). It engenders the idea of progress and evolution - that there is the possibility of developing from one point to another where the latter is

characterized as being a) situated further along a path and b) where the path represents betterment. This echoes the assumption outlined in the introduction: GIS maps are readily available to depict the world and to improve coordination.

This assumption is moreover rooted in the conceptual relationship between space and time. This modern conception of space as flat, homogenous and divisible separated it from time and indeed allowed for the prioritization of the former over the latter. This has been lamented by a variety of scholars who argue that this modern conception has prevented serious engagement with space (see for example Soja 1989; Massey 2005; Strandsbjerg 2010). Space is only insofar necessary as it represents the stage on which history plays out. Moreover, blaming Bergson as representative of modern thought, Massey argues that not only was space deprioritized "but in associating [it] with representation it deprived it of dynamism," of experience and lived space (Massey 2005:21). The map represented thus that which is immovable, explorable, navigable, and simply available.

And yet although the dynamism of history was separated from deadness of space, time, as a functional element was still required for mapping. Despite its production being situated within a historical context, the map itself is presentist, displaying the lay of the land, the world out there. Its only temporal marker may be the year of its production inscribed in a corner (Strandsbjerg 2010). Functional time, is subsumed into the measurement and "rationalization of space" (referring to Woodward Strandsbjerg 2010:81), necessary for the calculation of longitude for example. "Heterogeneous time [history and possibility is prioritized] over spatialized time of metrication with its quantitative segments and instances" (Boundas 1996:92). As a consequence Massey argues: "From the very earliest

days of Western philosophy, the capturing of time in a sequence of numbers has been thought of as its spatialization" (Massey 2005:27). Drawing similarly big conclusions, Walker suggests that the "fixing of temporality within spatial categories that has been so crucial in the constitution of the most influential of traditions of Western philosophical and socio-political thought" (Walker 1993:4).

Thus, linearity is both geometrical and historical: in terms of history, it represents a different temporal category from functional time, namely teleologocial time. Rather than capturing the cosmos, the map is a tool of the teleology of scientific progress, establishing the mastering of space via its knowledge production and visualization. Linearity in this sense then is reminiscent of and may even be argued to bear the liberal teleology of moving progressively throughout history. As a consequence, linearity, in the move away from the cosmological holistic realm towards divisible sovereign entities or imperial possessions, is vital to the imagination and practice of a new order. As Lebow clearly identifies, linearity has become the "template" against which everything else is measured – "curved, chaos and dialectics" (2009).

Territorialization

From the above it is possible to see how important cartographic techniques have been in this transformation of spatial imagination. Indeed, as Strandsbjerg and Branch have argued, the spatial ontology of territory becomes manifest in the process of mapping. "Territory in the modern sense requires a level of cartographic ability that was simply lacking in earlier periods, an ability that is closely related to advances in geometry" (Elden, 2005: 16). Partitioning allowed for the emergence of sovereignty and its inscription in space. Before, rulers' claims as to which spaces represented the realms under their control often overlapped. Now, because of the ability to draw lines, in a fixed,

independently existing space, political power became defined spatially in terms of its geometric size and the might to protect it.

Visualizing the state's territory allowed the formation of a state apparatus to reach into its territory. The map as functional tool of governance made space intelligible and thus controllable, allowing for example efficient collection of taxes, aiding thus in the manifestation of the centralization of power over a territory. In this process of state-making, another separation occurs: society as separate from space but locatable within it. In this way, society becomes the "object of administration and a subject of politics" (Häkli 1998:134). Although, as Bartelson notes in his *Genealogy of Sovereignty,* in political theory there is an on-going debate on whether the concept of sovereignty brought about territory or whether the demarcation of territory brought about sovereignty (Bartelson 1995).

However, the history of cartography stands witness to the manifestation of territorialization, its spread and industrial production and consequent internalization. This is by no means to say that the map represents the causal factor to the emergence of territory (for a discussion of this argument see Lebow 2009). Referring to Brady, Strandsbjerg acknowledges the presence of other contextual factors, which too played a role in the re-organization or rather inception of political space:

> "first, the recovery of populations and the economy after the Black Death had devastated communities across Europe contributed to a growing wealth of societies; second, the rupture of Christendom weakened the Catholic Church, questioned its universality and opened space for other types of authority dominating, such as secular state authority; third, the foundation of overseas empires started the process of integration the entire globe into a European economic political system" (2010:80, 81).

However, the map allowed for the inscription of power in spatial form and for the depiction of its political status. Even in IR it has recently been argued how important the role of the map has been to European state-formation (Carroll 2006; Strandsbjerg 2010; Branch 2011). This is no minor point, as Elden often reminds us, the concept of territory has been not been paid the necessary analytical attention within the discipline of IR and to some extent even within geography (Elden 2007).

The map has been central to the imagining of national identity. It represents the "symbolic constitution of mapped space as national space" (Pickles 1991:39). So, moving away from a mystical space in which one could fall off the horizon's edge, in which dragons and monsters occupied the periphery, God's realm was replaced by carved up spatial boxes commanded by rulers. These boxes are of course not only the sovereign territories of early modern Europe. They are also those of their imperial possessions. As Strandsbjerg argues, it is important to recognize that mapping as a cartographic practice, is movable and can thus be applied to all spaces, since space is ' the same' everywhere (2010). Thus, for empire space is empty (Lefebvre 2007:1), "a *tabula rasa* on which achievements of exploration could be cumulatively inscribed" (Woodward 1991:85).

The emergence of mapping as scientific technology therefore had four profound consequences: First, mapping with its techniques of measurement and calculation placed the world under one universal realm rendering it scientifically knowable. The rise of cartography ushered along a spatial revolution of tremendous magnitude on the small scale in terms of urban planning for example as well as on the large scale in terms of navigating the globe. Not only could the world now be depicted based on scientific rigor – giving everything its proper place – rather than on mysticism or dogma, it could also be

navigated and thus discovered and explored. Second, mapping is implicated in governance, aiding in the centralization of political power as vested in spatial entities which extend into sovereign and imperial territories.

Third, mapping is placed within a liberal teleology of scientific progress, in which the application of science will lead to greater knowledge and thus betterment for humanity. Fourth, mapping has aided in producing an imagination of the international system consisting of territorial boxes: "The boundaries of territorial states are what gives them their internally-turned focus, they have a strictly demarcated boundary – the lines drawn on maps – within which they have sovereignty – symbolised by the blobs of bright, contrasting color that fill the void between the lines" (Elden quoting Ackerman, 2005: 6). This has implications for how we seek to understand politics. As Walker argues

> "theories of IR can … be read as a primary expression of the limits of modern politics… they, especially, frame these limits spatially. Politics, real politics, they suggest, can occur only as long as we are prepared – or able – to live in boxes" (1993).

This imagination of the inter-national via the map has become so normalized that when any alteration is suggested, such as changing the projection, CJ's response in the West Wing, "it freaks me out" is no surprise. Indeed, maps have come to "provide the very conditions of possibility for the worlds we inhabit and the subjects we have become" (Pickles 2004:5). These features underline the normalization of the map as mirror image and therefore available logistics tool, ready to aid in operationalizing political projects.

The Map as Scientific Savior or Neo-colonial Oppressor?

Following on from the cartographic revolution, one can see how easily the map fits into the narration of scientific progress. It may represent a tool which opens up the world to greater knowledge extraction, thus controlling and being able to navigate it. This linear narration engenders a normative history of cartography, in which humanity step by step inches ever closer to greater accuracy, (for histories see for example Crone 1969; Harley 2001). Accuracy here becomes entrusted in the techniques of map-making with GIS representing the computational apex of the scientific story of progress. Improvement in technology bound up in Cartesian rationality means greater accuracy and thus improvement, betterment, and progress (Dodge et al. 2011b:3). The map as an artefact, whether as piece of paper or now as digital image, evolved into a naturalized scientifically accurate representation of the world.

However, this narrative of the map as purely advancing scientific progress is not uncontested. Its normalized understanding of merely depicting the world à la Rorty's mirror of nature (1981) is being problematized. Instead, the map's representational politics of what and how to depict and its ethical implications are widely discussed as potentially marginalizing and imperial. Its entanglement in European colonial empire-making from the 15th century onwards, to its role in the military-industrial complex of the 20th century as a tool of war write the dark history of the map. In light of this, the narrative of the map as embodying the linear progress story meets with resistance. Critical scholars have posed questions about how the map bears on those peoples and those spaces being mapped. They ask whether the map can really be a value-neutral artefact and whether it not always inscribes and serves particular interests.

In what follows, I outline this tenuous dialogue: On the one hand, scientific progressivism, couched in turn in liberal political and developmental progressivism, conceptualizes the map as a tool to make the world knowable in an ever more accurate fashion for the betterment of humanity. On the other, critical engagements focus on the map's inherent political effects, reframing the narrative of progress as one in which the interests of the few are the benefactors of betterment while the mapped are made (in)visible in the interest of control and government. This debate is mirrored in both the cartographic and the GIS literature. Indeed, a lot of scholars straddle both fields exemplifying their entwinement.

Sketching the evolution of this debate illustrates two trends: First it shows how the map becomes increasingly politicized, undermining its assumed neutrality. Second, a development takes place in which the understanding of the map as artefact is transformed by breaking down its object boundaries. The map becomes permeated by the space it represents and also includes those who map and their activities. In other words, when engaging critically with the map, the literature suggests, one must submerge the artefact into its relations with the environment, such as space, mappers and their doings.

In order to provide some structure to this debate, both applicable to the cartographic and the GIS map, I categorize it into three generations: The first generation debate focuses on excavating the inherent political nature of the map, the rehearsal of which can be observed in the literature on cartography as well as GIS. Each of these I treat in turn. The second generation represents a critique of the first by interrogating the latter's methodological rigor with which it produced an analysis of the map's politics. As a consequence, it is pointed out that this type of analysis holds problematic implications, presenting the map and the discipline of cartography as intrinsically

complicit in the colonial project. The second generation begins to extend the previous representational focus and draws attention to those who map and the map's situation in space. The third generation continues to push the representational boundary, further re-conceptualizing the map, accounting for its performativity. The impetus of moving beyond an analysis of the map as artefact relocates its politics into the newly opened spaces of performed production, space, and use.

The Cartographic Map is Political (the 1st generation)

Mid-20th century a lot of attention was directed towards making the map a more effective 'communication device.' The communication model approach (Robinson 1952; Robinson and Petchenik 1976) draws on psychology and information theory to investigate how colour and symbology work to make the map more legible. The aim was to "reduce error in the representation and to increase map effectiveness through appropriate design" (see also Crampton 2010:58; Dodge et al. 2011b:4). Drawing on cognitive scientists and behavioural geographers this model was further developed. By the early 80s semiology began to play a role, particularly its utility for graphic design. By the early 90s cognitive and semiotic approaches were combined with visualization theory in order to produce a scientific understanding of the function of maps (MacEachren 2004; Dodge et al. 2011b:4).

These efforts in making the map more efficient as a communication device rest on the assumption that the scientific techniques produce objective 'value-free' accurate representations. It is this stance which J.B. Harley's work began to attack. His work represents the gateway for the first generation of critique in cartography, by opening up the discipline to post-structuralist influences (Harley and Woodward 1987; Harley 1990, 1992, 2001). Drawing on Foucault, Derrida and

Barthes, Harley sought to expose the inherent politics of the map. Maps are social constructions, subjective versions of reality, historically and socially situated and thus always purposive (see also Wood 1992, 2008, 2010). There are always decisions to be made about what to represent, how to represent it and what to leave out. Harley particularly highlighted the power of maps and the power invested in maps by re-constructing the power/knowledge constellations in which maps are situated.

He works against the notion

> "that their reality can be expressed in mathematical terms; that systematic observation and measurement offer the only route to cartographic truth; and that this truth can be independently verified" (Harley 1992:154).

This renders maps as arbitrary and potentially hegemonic tools, which represent and make possible the pursuit of interests of those who commissioned or created them. What to represent, how to represent it and what this representation is then used for always engenders particular power relations. Rejecting the binaries of art/science, objective/subjective and scientific/ideological, Harley's self-expressed goal was to "subvert the apparent naturalness and innocence of the world shown in maps both past and present" (Harley 1992:232). Maps are partisan interventions with intrinsic political effects.

It is important to tease out this contention between these narratives: Maps indeed have a dark side as artefacts implicated in war and disciplining governance practices. Barnes for example chronicles what he calls "the mangle", that is the map's situatedness in politics, military intelligence, and geographic knowledge (2006; 2008). He explores the map's role in the military-industrial complex during the World Wars and the Cold War. Maps were of "strategic significance"

and used for "surveillance [...] political propaganda, boundary making of the preservation of law and order" (Harley 2001:55). As Harley notes, even before that "surveyors marched alongside soldiers, initially mapping for reconnaissance, then for general information, and eventually as a tool of pacification, civilizations, and exploitations in the defined colonies" (1987:57). Thus, the role of the map expanded from war into post-conflict governance and pacification. Historically, maps have been implicated in imperial state- and peace-making. Of course this does raise the question about the role maps play in current Peace Operations which even today have at times been labelled neo-colonial enterprises (see for recent example Turner 2012).

As Edney suggests, "imperialism and map-making intersect in the most basic manner" (Edney 1999:11). Indeed, the connection between mapping and governance is significant. Its ability to divvy up space, code territory as private, allowed for taxation and commerce. As Pickles argues, with its universal symbology and measurements it

> "subsumed local and regional differences in land practice, erased topophilic forms of value [...], and in their place in time established a universal language, not only of national forms of speech, but also of land and territory" (Pickles 2004:116)

The politics inscribed in the map as artefact became an increasingly interesting object of critical inquiry.

Having opened the doors of cartographic scholarship to post-structuralist influences, more work following these lines of inquiry ensued. Pickles (1991), read maps as texts, requiring deconstruction as method. Via a deconstructive analysis which allows for a multifaceted, contextual and interpretive reading and their intertextuality, maps offer an insight into their at times propagandistic meaning and purposes. Wood's *The Power of Maps*

(1992), also represents a major landmark in the early landscape of critical cartography. Drawing on linguistic and structural thought and Barthean semiotics, he shows how maps work as a complex sign system, producing particular versions of truth and thus again furthering particular interests.

As Muehrcke points out, the research agenda of the map as 'communication device' "encouraged [...a] shift [in] focus from the map as geographic thinking to the map as geographic illustration" (Muehrcke 2011:147). As an artefact the map is inherently political, either because of its situated ideological context or because of its semiotic make-up. The map as political artefact would thus render an analysis of mapping in Peace Operations as focused on the kind of visualizations produced and their fit within the Liberal Peace as a framework. However, the critical engagement pushed the limits of investigation further.

The Map Leaks (the 2nd generation)

The second generation continues the pursuit of analyzing the politics of the map. It at once articulates a critique of Harley's methodological rigor, interrogating its implications and offers its own critical research agenda. The scepticism of binaries which work to "privilege one set of knowledges over an 'other'" (DelCasino and Hanna 2006:38) introduced by Harvey and followed by a range of other critical geographers (Pickles 1991, 2004; Sparke 1998; Black 2000; Wood 2008, 2010) remains a major contribution. One point of contention with Harvey's work however is that his engagement is stuck in a representational frame; he never questions "the orthodox definition of maps as images of the world," (Belyea 1992:1). The map represents a closed off entity separate from the world, with the possibility for its (ethical) depiction. And it is here that the argument is made that Harley uses the method of deconstruction casually (Black 2000) by

merely drawing eclectically on Foucault and Derrida. As Sparks argues, he confuses demythologizing the map by revealing its situatedness and power/knowledge constellations with 'proper' Derridean deconstruction (Sparke 2011).

As a consequence, Harley's epistemological approach renders the map ontologically secure in its representational frame, available for use by the powerful. More importantly, this methodological 'misuse' and this type of analysis bear the effect of producing an image of cartography as "ideologically-driven" (Crampton 2001; Kitchin and Dodge 2007) and conspiratorial (Black 2000). More than its methodological critique this is the second generation's most powerful contribution. As Keates argues, "the question of how the production and publication of maps is controlled in any society is an interesting and important issue, but it is not illuminated by uttering clichés about hidden agendas" (1996:194). These comments begin to open up the possibility for interrogating the map's contingency.

Two narratives of the map are thus being questioned. First, as outlined throughout this chapter, the notion of a linear history in terms of technological progressivism is being questioned. Edney for example calls for a history of "Cartography without Progress" (1993). This kind of history would capture versions which have been contingent on the social, cultural, and technical relations in particular times and places. The history of mapping, or rather the histories, are not linear and do not follow a progressivist path. Maps cannot be judged on the basis of universal standards but must be situated within their particular contexts of emergence. Second, the seemingly smooth critical narrative of the politics of the map as fixed, potentially conspiratorial, resultant from the first generation literature, is being questioned. At the root of the possibility of these analyses and accounts remains the map as ontologically secure. By

questioning this security, it is also possible to begin to question the assumed inherent politics in its representational frame.

The map indeed has been a vehicle for European empire-making (Edney 1997; Craib 2004) in many places, such as the "Great Trigonometrical Survey" in India, Egypt, South East Asia, or the Southern Americas (Pickles 2004). Thus, they may silence the local, write out the indigenous, and make space seem available for government. Maps can do that. However, such an analysis, which merely focuses on the map, ends up ascribing agency to the mapmakers as hegemons, as henchmen of colonialism utilizing 'objectivity' as legitimizing empire. The map is stripped of the context in which it exists: the designers *and* users, its production processes and the spaces in which these take place. In other words, it privileges the representation over the practices in which it is produced.

As such, various critical voices of this 'critique as conspiracy' question the absence of the voice of the mapper. Godlewska for example argues that she has "found that most [cartographers] have a subtle and critical sense of the nature of their work and do not perceive cartography as an objective form of knowledge" (1989:97). Leaving these voices out distorts the analysis (Keates 1996). As Dodge et al argue, otherwise this line of epistemological inquiry "offers little or no value for those tasked with real world demands of making effective maps and they have little reason to contribute to wider theoretical debates" (Dodge et al. 2011b:5).

It is this second generation of critique therefore which begins to free the map from its representational frame, to open it up to recognize and include those who map and those who use maps. From this perspective, questions begin to emerge as to who the mappers are who work in Peace Operations and how they negotiate the purposes

and visualizations of their products. Indeed, if the politics and ethics of the map are not tethered to its ontologically secure status then how is mapping to be conceptualized? This links back to Autesserre's professional cultures which not necessarily represent a homogenous group of constituents of Peace Operations. It these epistemic communities which require further investigation.

Towards Post-Representation (the 3rd generation)

Challenging the map's ontological security importantly does not reject the first and second generation of critique but rather represents the next step in building on post-structural interrogations of the politics of the map. The opening up of the map's representational frame can be observed in a variety of ways.

For example, a move can be noted from what maps represent and mean to what work they do and the productive effects they have (Corner 1999). The fundamental tenet of representational theory, namely that the map as artefact exists separately from the space it represents, becomes problematized. Following Baudrillard, Corner on the one hand argues that space becomes territory via bounding practices of the map (Corner 1999) whereas King argues that the map as representation often already precedes the conception of territory (1996). In this cycle, space and the map are considered co-constitutive. It is impossible to distinguish between the real and the imagined. They are co-constructive in the sense that in the process of mapping or on the basis of a map, territories emerge. Or in Turnbull's words, maps make territories (Turnbull 1993).

Reconnecting to the beginning of this chapter, it is this argument which has most recently been made by scholars in international relations, recognizing the importance of cartographic practice for early European state-formation (Strandsbjerg 2010; Branch 2011).

Mapping made the imagination of territorial space possible, sustained it and has come to co-constitute it. Winichakul for example illustrates how the mapping of Siam went beyond the representation of its geography but in fact contributed to an understanding of what Siam as a nation was, producing a sense of a holistic Siam (Winichakul 1997). As Dodge et al put it, Winichakul demonstrates how the mapping of Siam also meant a "cultural re-imagining to produce a new 'geo-body' (a socio-geographical understanding of the country)" (2011b:389). Therefore "space is constituted through mapping practices, amongst many others, so that maps are not a reflection of the world, but a re-creation of it; mapping activates territory" (Dodge et al. 2011b:6).

Another move of opening up the map, also building on post-structuralist thought, is represented by the performative approach. DelCasino and Hanna argue that the map always stretches beyond its physical boundaries. The map is not limited by the paper on which it is printed. The map is "detachable, reversible, susceptible to constant modifications," (DelCasino and Hanna 2006:36). Performed through "bodily practices of walking, driving, touching, smelling and gazing" for example, they argue, following Gibson, that the map is always in a constant state of "becoming". They are interested in the breaking down of the 'natural' boundaries between the map as an artefact, the world, and its producers and users. Here then the possibility of the map's politics is contingent upon its performance – its production, and consumption. While the previous example allowed for the conceptual co-construction of the map and space, DelCasino and Hanna's emphasis on performance bring the social and spatial practices to the forefront, through which spaces are allowed to emerge.

Representational configurations of maps – maps as truths – as they are used within the sciences, are now often conceived of as mono-dimensional in this literature. Thrift, at the forefront of *non-representational theory*, argues for a prioritization of the experiential and the embodied over the textual for example. "Text only inadequately commemorates ordinary lives since it values what is written or spoken over multisensual practices and experiences" (Nash 2000:655 quoting Thrift). Thinking of a map of the Scottish Highlands for example, the map itself may represent text, depicting the monros, forests, and rivers. However, what is not accounted for in the map is this 'multisensual', the experiential. In other words, what is written out as unimportant is the experience of mountains, rivers and lochs – what they look like, feel, smell, taste or sound like. Nash argues however that Thrift's approach is "potentially limiting" since he prioritizes one over the other and therefore re-inscribes the dichotomy between representation and non-representation, between text and experience, (Nash in DelCasino and Hanna 2006:43). And yet, Thrift's move to bring in the embodied further destabilizes the map's ontological security.

In terms of conceptualizing maps it is thus necessary to account for what is written in and what is written out and why, as well as the embodied practices that are associated with mapping, such as experiencing the landscape via the map. DelCasino and Hanna argue that although the experiential is indeed important and should be accounted for, they do not agree with Thrift's assessment that it should take priority over the textual (DelCasino and Hanna 2006:43). Rather, there is a simultaneity at play.

The third generation thus seems to aggregate the insights of the previous generations: Taking the rejection of binaries beyond Harley's, the third generation include the separation between map

and the world. They consider the map's historical, social and cultural situatedness as important as well as the social and spatial performances, which bring it to life. The map as artefact becomes permeable, deflates as it were into its elements and their interaction. For Corner then, maps are an always unfolding potential, representing 'conduits of possibility' (1999) whereas similarly for Dodge et al mapping is to be understood as processual which goes beyond the mere focus on map design, meaning and reading but looks at mapping actions which "endlessly re-make territory" (2011b). Rather than ontologically secure, the map is always a simultaneous mapping. The map is dynamic. Moreover, this dynamism is always a relational process in that it involves mapmakers and users alike.

The GIS Wars (1st, 2nd and 3rd generation)

Geographical Information Systems "derive historically from mapping" (Crampton 2009, 2010). As a "technological advancement" (Kitchin 2008) or as "geography on steroids" (DeMers 2009), cartography merged with computer power. As a system of spatial knowledge production, Kitchin lays out this computational apex of cartography:

> "The spatial data that underpin map construction are now almost universally generated [...] by sensing technologies, such as remote sensing, GPS, LIDAR, and laser based surveying equipment. All this information is no longer stored as lists of coordinates and lines and shades on paper maps; rather, it resides as 0s and 1s in massive relational databases, brought into life as maps by computer code running sophisticated routines and algorithms. As such, spatial data processing is undertaken by specialist software and geographic information systems that analyse and manipulate stored data and output a variety of geovizualizations" (Kitchin 2008:213).

The logic of representation thus still applies. GIS still produces maps albeit if it is only one output of the information management system, it is still the most powerful one and sought after. Indeed, as the

following demonstrates, not only does the literature on cartography and GIS flow into each other, the debates on scientific progressivism versus its inscribed politics mirror each other.

In 1991, Coppock and Rhind state that there was little known about the history of GIS, since commercial and governmental agencies do not write papers on the use of technology, rendering academic researchers the main tellers of its story (Coppock and Rhind 1991:21, 22). In the context of geography as an academic discipline, it is argued that GIS really took off in the 1970s and 80s. Some tie its growth to the crisis of geography as a discipline in the 70s and its need to establish itself as explicitly scientific. GIS represented a new way forward, even a matter of survival for the discipline by way of constructing models of the world (Veregin and Pickles 1995:103, 104). These models created a point of contact between the geographer and the world, a way in which to make geography scientifically relevant. As such, it represents a seamless progression in making the world ever more accurately knowable.

Indeed, quickly the potential of GIS was recognized in the private sector which poured funding into development and training within the discipline (Sahay 1998). An alliance between private sector and the discipline was thus created, on the one hand rendering GIS development and use open to the needs of businesses and on the other, growing what was to become known as a sub-specialty group within the discipline of geography. In the 1990s the Association of American Geographers created the GIS Specialty Group which expanded to become the largest in the organization (Chrisman 2005:23). Chrisman argues that what ensued could be called GIS band-waggoning in the name of a "March of Progress" where "technology can fulfil every demand and bring you the world" (Chrisman 2005:25). Yet, as with the first generation of critique

outlined previously, this narrative of scientific progressivism does not go unquestioned.

The 1990s thus represent an era of heated discussion between scholars and practitioners around the boom of quantitative geography and particularly GIS, later dubbed as 'GIS Wars' (for a chronicle of the GIS Wars see Schuurman 2000). Schuurman categorizes this period into three episodes: The first episode (1988-92) is characterized by an interaction between critiques being levelled at GIS for being positivist and non-scholarly on the one hand and some defensive counter-responses by GIS supporters on the other. The second episode (1993-98) deepened the level of critical engagement and as a consequence produced a new research agenda on the impact of GIS technology on the social environment. The final third episode (1998-01) produced a rapprochement between both groups, generating more 'socially responsible' GIS (adapted from Crampton 2010:100). Thus, here too, the interaction between GIS as valuable technology and its political effects can be observed.

Initially, GIS was heralded as part of the technological revolution, seen as "a clear rational path toward a better tomorrow" (Chrisman 2005:25). Dobson, already argued in 1983 that GIS represented technological progress which one must inevitably adapt to (Dobson 1983). Although, in the following issue of the *Professional Geographer* Cromely (1983) and Cowen (1983) argued that practical issues of GIS still required dealing with, such as scope of interpretation and neutrality issues in regard to data collection and availability, the notion that GIS was a trail blazing technology remained. Minor issues on the technical front could not disrupt the understanding of GIS as scientific tool. Thus, as a real science, GIS propelled forward the belief of technological progressivism. It offered a way to model and represent the environment based on rigorous scientific rules enabling

rational and effective decision-making and problems-solving. It visualizes problems spatially, on a level playing field as it were, upon which then different problem-solving strategies can be simulated. This echoes the hopes the Brahimi Report inscribed into the technology for its role in Peace Operations.

GIS became framed as GIScience, generating the theory underlying the system components of hardware and software (Schuurman 2004:9). GIScience articulates the rules, standards and benchmarks, thus allowing for the evaluation of what can be labelled as scientific and what cannot. Indeed, ten years on from Dobson's original positive GIS vision, he stated that "GIS has become a *sine qua non* for geographic analysis and research [...] the beginning stage of a technological, scientific, and intellectual revolution" (Dobson 1993:431).

Shortly thereafter, the "progress-believing technologists" had to face the "humanistic oriented social theorists," (Chrisman 2005:26). Crampton records the AAG president Terry Jordan's statement in the 1988 AAG newsletter as the "first shot in the so-called 'GIS wars'" (Crampton 2009:98). Jordan stated that GIS was easily justifiable as it created jobs however it was a "non-intellectual" activity, drowning out the traditional branches of geographic scholarship (Jordan 1988). As a response, following the Friday Harbor meeting in Washington State in 1993, organized by the National Center for Geographic Information and Analysis, a new research agenda emerged. The so-called Initiative 19 "GIS and Society – The Social Implications of How People, Space, and Environment are Represented in GIS" built on three themes identified at the meeting: one, the intellectual history of GIS, focusing on the technology's social, and historical situatedness; and two and three, the impact and implications of GIS as ways of knowing and practices (Chrisman 2005:24).

Just about at the same time, the promise of GIS's neutral problem-solving potential was questioned in 1995 with Pickles' impactful "Ground Truth" focusing on the social consequences of GIS-use (Pickles 1995). Although amongst the contributors there were GIS 'insiders' (for example Goodchild) and believers in its progressive potential, the study began to deconstruct the nature of GIS as well as its relationship with the social world. And as Weiner et al point out, although there were previous engagements with "non-technical institutional and managerial issues" (Weiner, Harris, and Craig 2002:6) surrounding GIS as well as some engagement with social, political and ethical implications of GIS use, the GIS and Society debate focusing on its politics and ethics only really took off in the 1990s.

What was particularly at stake in these debates were the social impacts of GIS's underlying assumptions, which build on Cartesian rationality and Euclidean geometry so intrinsic to mapping. The following thus illustrates the proximity between cartography and GIS, repeating some of the themes outlined in the first section of this chapter. Sahay crystallizes these assumptions effectively in two main aspects. The first he argues, holds a "notion of reality that is spatial and objective in nature" (Sahay 1998:164). This relates to the already mentioned idea that reality represents an objectively representable playing field upon which strategies can be devised, visualized and tested. The second assumption underlying GIS-use is the "rational mode of planning that involves coordination of activities over time and space where both time and space are treated as finite and measurable commodities" (Sahay 1998:164). Reiterating what was laid out in the beginning of this chapter, it ultimately reduces space to a mathematical concept – homogenous in that it is infinitely measurable. Events can therefore be located – geo-referenced and geo-coded, held still, analysed and even reversed. The rational mode

of planning, governing and GIS use then allows for an "efficient coordination of action across time and space" (Sahay 1998:165).

From the humanistic side arguments were levelled claiming the technology's underlying assumptions of space and time to be exclusively Western in origin, thus problematizing its universal applications. Conception of space and time are historically and spatially situated and thus do not conform to one universal standard (see for example Harvey 2009:134–138). Moreover, GIS was seen as empiricist and positivist in nature, privileging facts or rather data over knowledge (Taylor 1990; Crampton 2010:98). This universal umbrella of science excluded the possibility of any other kind of sense-making, based on lived experience for example. Ethical concerns arose as a consequence (Curry 1991) where the experiential, the "lived space, or place, […] human or narrative time" become subsumed to an "other […] existing in Cartesian space and technical chronological time" (Lake 1993:408 referring to Curry).

However, not only Western conceptions of linear time and Euclidean space were problematic but also the concomitant Cartesianism and its resultant conception of subjectivity. Lake (1993) argues that the un-interrogated application of categories such as race, gender and class produces problematic understandings of subjectivity. The subject is stripped of its lived environment and complex constitution to then be merely accounted for as an entity with categorical attributes and a geo-referenceable location in time and space. It is argued that this positivist base which assumes neutrality and objectivity, value-free analysis, categorizes the subjects as object, and projects a mirror of nature (Rorty 1981), entails hegemonic power-knowledge constellations enabling control, violence/war and government. Following Heidegger, GIS may render the world as

"standing-reserve" (Heidegger 1977), open to calculation, and thus control.

It is from this line of argument that a variety of critical analyses emerged as counter-points to the situation of GIS in the narrative of scientific progressivism. Here, GIS is understood as proffering a rational, mathematical mode of planning and decision-making, disembodied of subjective experience of the environment. Foci of discussion include

> "surveillance and erosion of privacy; military deployment of the technology for warfare; use of the technology to facilitate and accelerate environmental devastation; its subservience to the interests of capital and its complicity in the production of the spaces of economic growth; masculinist premises of its algorithms; unequal access to both the technology and its information primitives (also known as the digital divide)" (Leszczynski 2009a:582). [2]

For example, Smith outlines the significant role GIS has played in the first Gulf War, making the war machine more efficient, ultimately contributing to the "killing fields of [the] Iraqi desert" (1992:257). As a consequence it is argued that GIS may be implicated in practices of violence and hegemonic governance. For the purposes of this thesis, being interested in the use of GIS in the context of UN Peace Operations, this line of critique seems of course particularly relevant. It poses the same question as the cartographic literature, namely whether GIS represents a potential colonial tool writing out those who ought to be protected and for whom the maintenance and building of peace is the most vital (chapter four elaborates on this further). However, these assessments do not account for the sociological

[2] For further critiques see, Taylor 1991; Taylor and Overton 1991; Smith 1992; Goss 1995; Pickles 1995; Monmonier 1996; Curry 1997; Katz 2001; Kwan 2002; Schuurman 2002; Schuurman and Pratt 2002; Smith 2005.

perspective this thesis adopts. This proffers taking into consideration and taking seriously the agency of actors involved in producing and interpreting maps. Otherwise, practitioners are without a voice absorbed by the politics of the map.

Outgrowths and responses

Amongst others, Openshaw (1991, 1992, 1997) represented the most ardent response to these critiques. He was concerned that these types of social theoretical critiques harmed and hampered the, what he deemed necessary and important contributions GIS has to offer to the scientific progress of geography. On the other side however, the social-theoretical critiques of GIS gave birth to a variety of other responses seeking to address the problems of GIS as spatio-temporal Eurocentric and with neo-colonial potential, silencing the subject. So-called Critical GIS includes feminist (Kwan 2002; Schuurman and Kwan 2004), and qualitative GIS calling for the application of a post-positivist sensibility (Pavlovskaya 2006, 2009). The movement in PPGIS, known as participatory GIS, seeks to address the problem of cultural ignorance and logistical access via democratization. Examples here include community-mapping projects in which maps are consciously co-produced and where access to the technology is equalized.

In the post-colonial and development context, GIS is used to empower local and indigenous communities to participate in boundary delineation, land right discussions and the protection of their environment (See Latouri in Craig, Harris, and Weiner 2002; Rambaldi, Tuivanuavou, Namata, Vanualailai, and Rupeni 2006 for an example of community mapping from the Fiji Islands). Thus, just as Wood and Pickles have pointed out in reference to cartographic maps, in one instance GIS may be implicated in war, yet in another it may act as a tool for resistance. This renders the politics of GIS

situated within a binary frame, with its purpose and effects to be determined as either for a greater good or a moral evil. Moreover, this suggests that politics can only emerge from 'the local' whereas all other actors within 'the liberal machine' seem to *a priori* toe the line.

Acknowledging the possibility of using GIS as tool for resistance begins to destabilize the thus far predominantly binary set up of the debate in which GIS maps are either scientifically progressive or politically oppressive. As laid out earlier, exchanges occurred on the questions of whether the focus should be on how this technology can best and most effectively propel human progress or whether some conscious self-reflexivity should be exercised in order to investigate the impact of GIS on the social world in its cultural plurality. Chrisman avers that all of these discussions have their merit and have contributed to the understanding of the nature of GIS. However, what has been left out he argues, are the people using the technology (2005). This is a similar point to the one Godlewska made in 1989, when she stated that the cartographers she encountered did not assume their science to be either objective or a-political.

Also the logic of the actual practice of GIS use in particular instances and the negotiations occurring within these processes require to be taken into account. Chrisman argues that in the end "some person still clicks that mouse" (2005:31). In other words practitioners are involved in the production, the decision-making, ultimately in the negotiations that lead up to map-production. And yet practitioners have been mostly absent from this debate but have rather been subsumed in the politics and ethics as associated with the technology. Their agency has not been taken into account. The debates surrounding the politics and ethics of GIS have often occurred on a rather abstract level. Sahay, investigating the implementation of GIS use in India, i.e. in a non-Western context,

makes a similar argument in that he states that the context of the implementation is vital to its understanding (1998). As Muehrcke argues, within the literature there may have been a pre-occupation with the map as "geographic illustration" which in turn reduced emphasis on the

> "process of mapping [which] was recognised often to be more insightful than the map itself. A person attempting to structure the environment in map-like terms is forced to make judgements that can greatly enhance understanding of the material being mapped" (Muehrcke 2011:148).

What Muehrcke alludes to here is that investigating context-specific processes of map production may allow for a better insight into how what is supposed to be mapped is understood. Spatial knowledge production is not rendered merely in the GIS map as a thing to be looked at. But it is situated within the decision-making leading up to map production. Where does this leave us? From the GIS and cartographic literature we can see the evolution of the debate moving away, indeed *post-* the representational analysis of maps. There is a definitive move to include people who use the technology, the context in which it is used, and the space it ought to represent. The politics of the map is thus not technologically determinist – as progressive, oppressive or emancipatory, but contingent. Politics is made. This move beyond the map's assumed ontological security towards its contingency is affirmed in a definitive move to conceptualize the map as practice.

Towards Mapping as Practice

The emphasis on designer, user, context and process, undergird the notion that mapping is contingent rather than ontologically secure. Gradually, the literature breaks down the map into ever more elements seeking to enrich its understanding. Mapping as a practice

then engulfs a myriad of negotiations.[3] And as negotiations are intrinsic to its practice, its politics are contingent rather than ontologically settled. Allowing for this kind of openness, renders thinking about maps as always simultaneous to thinking about mapping, as "constellations of on-going processes" (Dodge, Kitchin, and Perkins 2011a:16). Processes do not only relate to map production then, in the linear sense of collecting data, categorizing, analyzing and visualizing it. Rather, the 'constellation' refers to the myriad of always on-going negotiations as the following illuminates:

Drawing on previous insights from the literature, as a practice the map is disassembled, extended, and includes a consideration of those *who produce it, their doings, knowledge and skill, the materials used, the cultural, historical, and institutional context in which it emerges and in which it circulates and is used, and those who want and use it, as well as the spaces it seeks to represent and constitutes.* The map is always permeated by these elements. It is here that contingencies emerge, where the possibility for politics can be thought of as simultaneous and otherwise. Politics does not *merely* emanate from the artefact. Politics is not *merely* situated in the way in which mapping has become possible to be theorised in a particular time and space. Nor is it *merely* situated in its material make-up. Politics is contingent upon all of these as they are negotiated *in practice*.

It re-locates politics from the map as artefact to mapping as a UN practice. An analysis of this kind asks for a discovery of this world, rejecting a prefiguring of mapping as a closed off process of which the map is a natural result. As a practice it always requires negotiation

[3] Mapping also defined as practice by Kitchin (2008) who also seeks to unpack the representational frame of the map. While I borrow the terminology and the impetus, the way in which I conceptualize it is customized to this project.

and is not merely a tool to enable better coordination and efficiency. Dodge et al's concept of onto-genesis provides the synthesis of the theoretical journey thus far and is therefore worthwhile quoting at length:

> "[onto-genesis] denies maps any ontological security as representations of reality and instead posits that they are always in the state of becoming, brought into being through embodied, social and technical practices to solve relational problems such as plotting, planning, navigating and so on. Maps then emerge through a mix of creative, reflexive, playful, tactile and habitual practices; affected by the knowledge, experience, and skill of the individual to perform mapping and apply them in the world, and shaped by the context of its reproduction. The map does not re-represent the world or make the world, it is a co-constitutive production between inscription, individual and world; a production that is constantly in motion, always seeking to appear ontologically secure. [...] It moves away from notions of accuracy, design, aesthetics and power, to emphasizing the complex, contingent interactions between cartographers, users, maps and the world" (Dodge et al. 2011b:6)

Onto-genesis conceptualizes the map as organism, always evolving where being (onto) is created or born (genesis), thus constantly becoming (Crampton 2010:111). As an organism it represents the life world of the cartographer, their interlocutors, the maps and the world. The evolutionary aspect of the notion of organism echoing a Heideggerian move from being-in-the-world to *becoming,* (Kitchin and Dodge 2007; Dodge et al. 2011a, 2011b). It represents a "philosophical shift towards performance and mobility and away from essence and material stability" (Dodge et al. 2011a:17).

To further substantiate the purpose and material character of mapping practice, Dodge et al operationalize *onto-genesis* via two other concepts: technicity and transduction.

Technicity represents the material aspects of this *becoming*. It

> "refers to the extent to which technologies mediate, supplement, and augment collective life; the unfolding or evolutive power of technologies to make things happen *in conjunction* with people" (2011b:113).

Technicity then, is rather different then technical. Technicity is relational and again contextual and purposive. It is not mere material but always already implicated in the doings within a context and to a particular end. Leszczynski has recently argued for a 're-materialization' of GIS studies. She argues that the material substance of GIS gives it its specificity on the "level of empirical objects." In other words, the "formalization" inherent in GIS, that is the "transposing [of] concepts into computable packets gives limits to what kind of representation is possible" (Leszczynski 2009b:595). The "epistemological shortcomings" of GIS, which have been outlined previously in the GIS literature, which for example privilege the physical geography over the "attachment to landscape," its 'epistemology of the grid,' is framed by its "brute code." Or, via Schuurman (2000), it resides in the "component architecture of technology." For Leszczynski, the materiality of GIS gives it its technological specificity. Its materiality "locates effects" as "emergent from [its] reductive Boolean logic" (Leszczynski 2009a:596).

While it is important to be sensitive to this material specificity highlighted by Leszczynski, from a practice perspective materiality is always, as set out here by Dodge et al, relational. The limits of GIS or its potential are not merely determined by its materiality but are contingent upon their relational negotiation in practice. It is reminiscent of Akrich pointing out the difference between the design and use a creator of a technology intended versus the user's interpretation of the design and ultimate use (1992). Indeed, materiality is limiting. However, its relational situatedness frames its contingency. Its meaning has to be negotiatied. Mapmakers still have to construct, interpret and implement cartographic rules. They have

to negotiate the materials and resources vital to map-production, from procurement to conducting analysis. These decisions and management tasks by themselves make mapping contingent, as it requires a concerted effort by all elements, material and human, to work together in order to produce a map. However, this environment in which mappers map is not isolated from but set in relation to that of their clients for whom they produce maps. Therefore, while technicity points to the material limits of GIS, such as the Boolian logic framing representation, it is always already bound up in transduction.

Transduction is about tracing how maps evolve as a way to solve relational problems, how they morph into different shapes and meanings via a particular purpose. They make a point of not distinguishing between map-making and map-use but state that *all encounters* with maps are always emergent – they "all are (re)mappings – the (re)deployment of spatial knowledge and practices" (Dodge et al. 2011b:112, 113). It is these notions of encountering emergence and becoming which are the most useful. As they state,

> "all emergence is contextual and a mix of creative, reflexive, playful, affective and habitual practices; affected by knowledge, experience and the skill of the individual to perform mappings and apply them to the world" (2011b:113).

Transduction has two effects for thesis: First, it allows for an account of how GIS practitioners negotiate the use and meaning of GIS as a professional community and second, *how* they translate the meaning of their work to their clients for whom they produce maps. How maps and mapping are understood by these professional communities therefore bears on the interaction they have with one another. "There is constant modification where each encounter with the map produces new meanings and engagements with the world" (Dodge et

al. 2011a:20). Therefore, these negotiations make up the map's contingency. The map then becomes an open "vehicle" (Yanow 2000) through which problems become negotiated and imaginations of spaces are rendered opened or closed. The world of mapping is revealed via the map.

Returning to Leszczynski, she makes another important point worth highlighting. Critical engagements with the map and GIS thus far have drawn considerably on philosophical debates and social theory. Yet, it is important to be sensitive to the language of inquiry and its relationship to the language of GIS. For example, she argues that the "presence of the technology," that is its material presence, has been subsumed or in fact ignored by a discussion of the technology as "a technology of representation" (Leszczynski 2009a:612). Here she particularly refers to the work of Pickles. This creates a problem of language: The meaning of representation in GIS is different from its meaning in critical geography:

> "When we say 'technologies of representation' in the context of GIS, do we mean Foucauldian technologies (as systems of knowledge that do work in the world), or technologies of 'the box' (representation in the database sense, as in a schema or record?). When Critical GIS scholars of GISscience theorists and researcher use the phrase 'technologies of representation' they may well be referring to the latter without intending to invoke the former" (Leszczynski 2009a:612).

Thus, investigating mapping as a practice requires a linguistic and conceptual sensibility: On the one hand, it is important to understand the concepts and terminology used by practitioners and how, the extent to which they are shared, impacts the formation of epistemic communities. On the other, it means to pay attention to how they relate to the researcher's concepts of inquiry. This will be

outlined further in the following chapter on how to methodologically investigate practice.

In order to utilize Dodge et al's concept of onto-genesis as a conceptualization of mapping as practice, it requires another amendment or rather a clarification. Reading the extended quote given above, it almost seems as if mapping were an a-temporal activity, that is GIS as a computational outgrowth of cartography is temporally non-specific. Mapping as practice is – mere that – practice. However, having dedicated an entire edited book to the ways in which to read maps, Dodge et al recognize the heritage from whence GIS came, its history, epistemology and spatial imagination (Dodge et al. 2011b). Mapping as onto-genetic, as practice, is not separated from these readings. Indeed mapping as practice, as this literature review shows, represents almost an aggregate outgrowth.

Crampton for example argues for an investigation of the ontology of GIS as part and parcel of the project of cartography. He is interested in the meaning of its being, as a historically specific system of spatial knowledge production. Such an inquiry requires the examination of its "core foundational knowledge," that which makes it possible and gives it its meaning (Crampton 2010). At the beginning of his book, Crampton argues for a critical engagement with cartography as there is a "need to examine the very rationality that animates mapping and GIS today" (Crampton 2010:7). The second chapter is entirely dedicated to explaining, "What is Critique?" via Foucault. As he explains, this requires a focus on 1) the unexamined ground of decision-making; 2) a situation of knowledge in history and space; 3) an uncovering of power/knowledge relationships; and as a result 4) a challenging or even overthrowing of naturalized categories of thought (2010:14–16).

In this context, Foucault's history of the present inspires Crampton's "historicized genealogy" to show how certain truths have come to be produced and what effects they have (Crampton 2010:106). 'What animates mapping and GIS today' is thus not universal or natural but historically and spatially specific. In other words, GIS is historically contingent. It is in this sense that he pushes beyond Harley, digging beneath the map as the object of analysis, posing the question of how it can come into existence in the first place. Thus, the point of departure maybe presentist, GIS mapping today, but its exploration of its conditions of possibility of its meaning is retrospective. In other words, it is about an examination of the paths taken or not taken, about their naturalization, about how it came to be. The contingency of the present is thus excavated via its past(s). This is precisely the meaning of a 'history of the present' – the past made possible the present in this particular way, allowing the map to appear as a scientific, natural artefact for example. For him this kind of investigation can account for the "meaningful lived experience" that is the being of GIS (Crampton 2010:108). He argues "we don't learn anything about being in the world by abstractly staring at something and listing its properties. Rather, we need to *encounter* the world in its being" (2010:108).

Introducing Crampton's approach in relation to practice highlights the following: The distinction is that while its historicity, its 'epistemology of the grid' and concurrent cartographic imagination, as laid out in the beginning of the chapter, plays an important role, they do not solely determine GIS. In other words, a reading of the role of GIS via its history, epistemology and imagination alone would be insufficient. Through a mapping as practice approach, one not only takes these into account but investigates how they are negotiated in and through practice. It looks at how structures are enacted and affirmed or how they are enacted differently. This approach allows for

its contingencies to emerge, destabilizing its ontological security, placing the politics of mapping into its practice rather than rendering it inherent in its representation.

Conclusion

The review of this literature holds important implications for the theoretical and methodological framing of the thesis. First, as the first generation argued and the second and third generation acknowledge, the map as an artefact, as a text, inscribes the possibility of political effects. While they are not innate, the map may do work in the world, by writing in or writing out spaces and people. It has the potential to do violence or enable political empowerment. These accounts have created a critical framework which forces a sensitized approach when dealing with the map as artefact. The literature demonstrates that representationally, there is always something at stake in the map.

However, I argue that a representational analysis also merits caution. Applying such an analysis to the use of GIS in UN Peace Operations may lead down a problematic path, given the literatures on the politics of Peace Operations: The linear production process, i.e. data collection, storage, analysis and visualization, as well as the assumption that underlie this process line up easily with the binary assessments of Peace Operations. GIS as a tool fits the narrative of progress relying on Cartesian rationality and scientific rigor propelling progress. It also renders GIS, as critical accounts have suggested in the context of military operations, as a tool in the liberal hegemonic machinery of the Liberal Peace. It portrays GIS maps as tools oppressing or writing out the very people and places they seek to protect. This however is a narrow analysis, which does not account for the socio-material negotiation processes, i.e. its practice. While there are epistemological assumptions undergirding GIS, they do not define or circumscribe mapping *a priori*. As a consequence, it is

impossible to deduce its politics from its assumptions as if they are fixed.

In fact, second, the effects mentioned above (doing violence or enabling political empowerment) are indeed contingent upon and become complicated by those who map, the technologies involved and those who use maps. It is their performances and negotiations which make spaces emerge. Third, once these social and spatial practices move into the foreground, new spaces of contingency are revealed affecting the politics of the map. Summing up the evolution of the cartographic and GIS literature, Pickles ponders:

> "I am suggesting an 'end of cartography as we knew it' or that 'cartography is not what you think.' It is and perhaps has always been a multitude of practices.... Lines of flight... coded and recoded by forms of institutionalized power, but always with leakages. This decentering of hegemonic formalization of techno-scientific capitalism opens mapping to its own plurality of socio-spatial practices, to its own geographies, to its own conflicted and highly contested nature, and to its many roles in inscribing lines and delimiting identities in the modern world" (2004:189).

It is thus its leakages, plurality, and contested geographies of GIS in UN Peace Operations this thesis seeks to explore. These are not universal but must be particular to the context in which they occur. This requires investigating GIS use on its own terms and according to its own logic in order to avoid reproducing and reifying the GIS Wars binary of maps as progressive or oppressive.

The frame of mapping as practice is therefore theoretically appropriate, as exemplified by Dodge et al's concept of onto-genesis. The point here was not to introduce concepts to then operationalize in the empirical investigation. Rather, the aim is to frame and ground the purpose of this thesis theoretically. Dodge et al reject a distinction between map-making and map-use, arguing that this

suggests a strict separation between production process and interpretation, whereas engagement with the map is always world-making. In this thesis I root these engagements and lines of flight in the epistemic interactions within and between the mapmaking and map-user communities. It is the extent to which these communities produce a shared understanding in their interactions which mediates the production of its politics. The map is central to these interactions.

This gives theoretical and methodological focus: mapping as practice must be encountered with a set of sensibilities. As this chapter demonstrated it is important to root mapping in its historical narrative, highlighting the intricate role it has played in the modern imagination of space and its political constitution. Moreover, it requires of the researcher to be materially or technicity-sensitive, accounting for context/purpose, designers and users, and to adopt a sensibility to the language of the technology and its philosophical critiques. The next chapter represents a reflection on what I encountered in this world, from sites to materialities, how I gleaned meaning and particularly, how I situate myself within this encounter. The narrative of fieldwork is itself a tale of practice in the everyday, with its own becoming horizons of possibility. And as such, there were challenges, surprises, unexpected consequences – it was most of all a journey. In this next chapter, I elaborate on the logistics of this project and the methodology of investigating GIS mapping in Peace Operations as practice.

3 Terra Incognita: The Methodology of Investigating Practice

"When I speak of digging, I mean digging in the shadows, or the penumbra produced by master categories"

(Sassen 2009:120)

Metaphors of space seem apt to begin to describe my fieldwork experience. As a student of international relations and peace and conflict studies, the world of mapping was an unknown territory to me. Seeking to map it required me to venture into it and discover it. From the very beginning of this project there was a constant simultaneity represented by mapping practice, as at once describing my research endeavour and object of investigation.[4] The Brahimi Report's statement on GIS use had presented my point of departure. I knew this technology was used, I had a sensitized frame of the possible political effects of the map from the literature; I knew I wanted to investigate the everyday practice dance of map, technology, mapper, user and the world. However, I did not know where mapping happened or who the mappers were. Moreover, although I audited an introductory course in GIS in the Department of Geography at the University of Edinburgh (second semester 2010), I was still largely a laywoman where GIS was concerned. Thus my object of study, mapping as practice first had to be brought into view. It had to be mapped. Ultimately through this research and this thesis I was as

[4] A similar point is made in Chapter 2 in Critical Security Methods: New Frameworks for Analysis (2014). It explores mapping as an innovative methodology to security studies while acknowledging that mapping too, abounds as a practice of security itself.

much creating, inscribing and representing the world of GIS mapping in UN Peace Operations as UN Cartographers create post-conflict worlds through their maps. In a way this thesis is a map to mapping practice.

The relevance of understanding GIS as a technology of spatial knowledge production in the UN and in the context of Peace Operations seemed obvious enough. Talking about my project to IR and peace and conflict scholars, they were interested in questions such as what is the specificity of this technology; does it change the way we think about space; what is the implication for Peace Operations on the ground? But they had as much an idea of maps as I did. The articulation of these questions demonstrated the lack of understanding of the logic of logistics broadly and spatial logistics of mapping specifically. Visiting the International Studies Association in 2012 and 2013, I was the only one who presented a paper on GIS. To geographers and cartographers the questions were also interesting but I was unable to find anybody who specialized either in Peace Operations or in the UN.

Facing this lacuna everywhere I turned made the planning and design of this project difficult to say the least. I was confronted with a world which seemed utterly elusive, lurking in the shadows and which nobody really talked about in the context in which I was interested. Thus, the course of my entire fieldwork represented a journey of discovery and learning, filled with struggles fighting for access, anxiety of not being able to gain it and fearing not being qualified to investigate it. Planning and designing this research project therefore did not entirely occur before my fieldwork but happened whilst in it, being in constant flux, requiring continuous adaptation. Because of these struggles, I consider the mapping of the architecture of this world, its discovery, shining a light on those

spaces, materials, and contingencies, and giving voice to those people who map as a valuable contribution in itself.

The purpose of this chapter is to tell my fieldwork story and to outline my methodological choices as commensurate with a conceptualization of mapping as practice. The chapter consists of four parts: First I articulate the assumptions that come with conducting an interpretive empirical study. The second part tells the story of how the sites of my fieldwork gradually emerged in order to provide an initial overview of the landscape. It also frames the process of project design and planning as continually adapting during fieldwork itself. The third section focuses on the methods of data generation while the fourth explains my mode of analysis and the rationale for my writing-up process.

Although, as has been pointed out, the connection between the cartographic literature and that of IR has only been made substantially in a couple of instances, (Strandsbjerg 2010; Branch 2011; see particularly chapter on mapping as methodology in Aradau, Huysmans, Neal, and Voelkner 2014), the conceptualization of maps as *practice* presents a point of convergence. As a body of work, practice has a rich history, exhibiting huge diversity and has also moved into international relations. Drawing on the practice literature throughout the chapter provides greater theoretical and methodological depth to the framing of mapping as practice. It combines the conceptualization of practice with the specificity of GIS mapping.

Mapping Practice Assumptions (I)

The assumptions present in this thesis are fundamentally bound up in conceptualizing mapping as practice. Thus, in the process of laying them out, and in order to ensure commensurability between my

theoretical framing and methodological choices, I draw on Practice literature.[5] This body of literature as stated above, represents a point of convergence between critical cartography and international relations, between onto-genesis and practice. Its breadth in adaptation is evident in the disciplines and sub-disciplines it covers as well as the development of specific approaches: from philosophy (Wittgenstein 1958; Dreyfus 1991), social and cultural theory (Foucault 1976, 1980; Bourdieu 1977; Giddens 1979, 1984; Lyotard 1984, 1988), to science and technology studies (Latour 1987, 2005; Pickering 1995; Rouse 1996), organizational studies (Nicolini, Yanow, and Gherardi 2003; Miettinen, Samra-Fredericks, and Yanow 2010), and policy analysis (Wagenaar 2004; Freeman, Griggs, and Boaz 2007). As pointed out, IR too, has recently been experiencing a practice turn (Neumann 2002; Pouliot 2008; Adler and Pouliot 2011b; Adler and Pouliot, 2011a; Bueger 2011a).[6]

Although not a "unified theory" (Miettinen et al. 2010:1312), one can find a multitude of definitions of practice which seek to articulate the common ground among such diversity. In the "Practice Turn," Schatzki, a prominent practice scholar in the philosophy tradition, defines the core understanding of practices as "embodied, materially mediated arrays of human activity centrally organized around shared practical understanding" (Schatzki, Knorr-Cetina, and Savigny 2001:2). This definition echoes and gives greater substance to Autesserre's reference to Rubenstein's professional cultures and their

[5] Practice theoretical and analytical work has been burgeoning in a variety of disciplines (Miettinen, Samra-Fredericks, and Yanow 2009).

[6] Specific approaches "regarded as practice-based include" communities of practice (Wenger 1999), activity theory, socio-cultural theories, actor-network theory (Latour 2005; Law 2010), activity-based approaches to strategy (Jarzabkowski 2005; Johnson 2007) and cultural perspectives on organizational learning (Nicolini, Yanow, and Gherardi 2003), (adapted from Sandberg and Dall'Alba 2010:1349).

constitution as based on shared understandings, as set out in the introduction. Practice theory, -approach or –oriented analyses are interested in the everyday, mundane organization of social life. Practice and structure are therefore fundamentally interrelated. The use of GIS within UN Peace Operations is not circumscribed by its institutional organization. Rather, it is the practices which co-constitute this organization through continuous re-production or contestation.

Rooted in post-analytic, phenomenological philosophy, according to Miettinen et al, practice has an empirical and theoretical program both of which hang together. Empirically, practices are conceived of as the lowest common denominator or "smallest unit" to understand the organization of social life (Mattern 2011:70). The *study* of practice thus comes with an "ethnographic sensibility" focusing on doings in everyday life (Miettinen et al. 2010:1312, 1313). This lens on the "here-and-now" (Miettinen et al. 2010:1309) means to understand GIS mapping by investigating what it does, "how people use it, in particular contexts" (Schwartz-Shea and Yanow 2012:23). It is this kind of proximity that allows for an encounter with the 'practiced' professional culture.

This practice perspective makes this project thoroughly interpretive and brings the material 'life world' of mapping and the 'lived experience' of mappers in it into focus. An interpretive stance comes with its own ontological and epistemological assumptions regarding its methodology. Ontologically, counter positivist assumptions, it positions the researcher thoroughly "in, alongside and toward the world," (Pickles 1985:17), *always already within* and thus not able to claim objective truth about the world. The point is not to reveal verifiable facts about GIS mapping at the UN. In fact, being placed within the world has epistemological consequences in that the

researcher cannot simply collect data from a world out there from which he or she is distant and neutral to. Whatever the findings of this project, they are the product of my-being-there. They are inter-subjectively co-constructed with the mappers and people I met in the field. They are shaped by my experiences of *being in* these places. And they are influenced by the materials surrounding me, from the physical environment to machines, buildings, bodies, and of course maps.

The representations, indeed my own mapping of UN GIS mapping practice, therefore do not *represent* what mapping *is* ontologically. I cannot pull off the 'god trick.' Instead I give insight into its practices which bear contingencies, telling a story of mapping derived from my time situated in that life world. These written up representations are thus ultimately based on my interpretation of the mapping world in particular spaces, during particular times. The relevance then is that they are provocative, by hooking into and exposing what has thus far lain in the shadows, drawing out its complexity and emergent politics. Importantly, this does not make interpretive research relativist. On the contrary, as Schwartz-Shea and Yanow argue, the persuasiveness of what is constructed is dependent upon having made appropriate theoretically informed methodological choices (2012). It is these which I outline here.

Mapping Mapping, I wish there was a map to the field

Fig. 2 Map of my Research Journey

Before delving deeper into the methodology of practice, it is important to outline the gradually emerging landscape of the mapping world, that is the sites, people, and materials in it, in order to provide reference points for the discussion. Above (Fig.2), I have used a screen shot of a Google Earth map depicting the sequence of my investigation into mapping from Edinburgh, to New York to Brindisi to provide the reader with a tool for geographic orientation and give insight into the global scope of the study. As stated at the beginning of this chapter, my fieldwork was a journey of discovery. As a consequence my research design, beyond articulating research questions and situating myself in the literature, was rather

provisional. Methods of research, from planning, design, to case and method selection for data collection and analysis, are often taught as a linear process. It presupposes that the researcher unwaveringly knows what they want to know about from the beginning and has 'control' over the process (Schwartz-Shea and Yanow 2012). In other words, it is possible to select the sites, and use the research questions to identify the appropriate methods to then make them knowable. Since this was particularly difficult in my case, where the field only came into view in the process of fieldwork, my research design is not situated prior to but thoroughly within the research process itself. The 'life world' of GIS mapping at the UN *emerged*.

Practice-oriented research is particularly appropriate for such a project of discovery. Often such practice inspired projects can be described as 'digging in the shadows,'[7] focusing on the "quotidian" interested in "how [from an IR perspective] world politics actually works" (Adler and Pouliot 2011c:1, 3). It requires researchers to adopt the role of a detective.[8] One starts in one place and begins to dig, ask, make connections and follow those. Employing a "search and find" strategy (Reckwitz 2008:195), it "involves tracking and tracing", (Austrin 2005b:148) "following the actors" (Latour 1987) in an "attempt to make the world orderly" (Bueger 2011b). Again here we can see the simultaneity of mapping practice. Discovering it – mapping practice – required it – practicing mapping. However, I needed a starting point. The emergence of the mapping world is then, following Yanow, the product of a flexible "improvizational" research process. This does not mean that anything goes. On the contrary this

[7] I borrow this notion from Saskia Sassen (See Chapter 7 in Kenway and Fahey 2009).

[8] This is a Latourian notion I borrow from (Austrin 2005).

strategy requires careful adaptation and navigation of the field, making justifiable decisions (Yanow 2009:292).

The beginning was in Timor-Leste. Having no idea about where mapping happened or who the mappers were, I decided to go to Timor-Leste in the second year of my PhD, in order to begin to 'dig in the shadows.' Timor-Leste was my pilot case study, a post-conflict space to search for maps, mappers, users and mapping. I had done previous research on Timor-Leste during my Masters in Peace and Conflict Studies and so was familiar with its history. The UN had basically taken over the country's sovereignty in 2002 as it emerged from civil war, in order to ensure and guide its way to a peaceful transition (Chopra 2000). The UN's initial transition mission, UNTAET, had been heavily scrutinized. Acting as a de facto separate government, the mission was criticized for being heavily invasive, excluding local capacity, imposing strict reforms, and thus being conditional in character (Chopra 2000; Goldstone 2004; Richmond 2005b).

As a consequence of the intense criticism, it seemed that UN involvement in the state-and nation-building endeavor was under the microscope for years to come. The reasons for beginning my exploration of mapping there was that it presented a space where mistakes and mismanagement created a perceptive environment in which consecutive missions had to move forward carefully. Questions of how the country was to develop in a way that was not imposed by the international community but was grounded in collaboration with local communities were of great concern. This environment sensitive to the political effects of missions seemed pertinent to my initial interest in post-conflict spatial knowledge production and its relationship to decision-making and project design. Here, I hoped to

locate GIS as a logistical tool enabling this production and informing policy.

During my internet-based research on mapping in Timor-Leste, I came across an advertisement for a 'GIS week' for November 2010. It was organized by the Geographic Information Group Timor-Leste, supported by key players in the country's development, such as the Timorese government, UNDP, USAID, UNFPA, UNICEF, WFP, and the EU. This represented a great opportunity to explore mapping in a post-conflict environment. Thus, I decided to go in November 2010. Since I was not visiting any particular stakeholder, access negotiations were not an issue. Moreover, safety was not of great concern. I had been in contact with other researchers who had been conducting fieldwork in Dili over the previous couple of years. The last violent incident occurred during the 2008 elections. Since the next election was not to take place until 2012, nobody seemed to anticipate further outbreaks any time soon. Moreover, I had arranged my accommodation, again through other researchers, with the honorary consul for the United Kingdom. Her long-term experience of living in Dili and her thorough connectedness added to my sense of safety. I spent three and a half weeks mainly in the capital of Dili, seeking to speak to as many stakeholders as possible, including development agencies, government ministries and of course mappers.

It was through the head of the Geographic Information Group, whom I met at the GIS week that I was able to get in touch with the head of the UN GIS Field Unit in Dili. He began to outline the UN architecture of GIS mapping. I learned that the Cartographic Section at the UN Headquarters in New York represents the strategic center. According to him, they are responsible for policy-making and strategic decision-making. Situated at the headquarters, they are in close proximity to the planning centers of Peace Operations which turned out to be their

clients. The GIS Center in Brindisi, Italy at the UN Logistics base represents the operational center for GIS mapping supporting missions in the field, providing training and IT support. This architecture seemed to represent the world in which mapping happened and was coordinated from policy to the field. It seemed to me that if I wanted to understand how mapping works, how it is understood, and the role it plays in operations, I had to go to these sites and talk to practitioners.

As soon as I returned from Timor-Leste at end of November in 2010, I sought to contact the Cartographic Section and the GIS Center. Contact details of UN staff are not readily available on the Internet. It took a lot of creative investigation, i.e. 'detective work.' For example I was looking for randomly uploaded meeting memos of the Section or the Center in the hope to find attendance lists and email addresses. This is how I found a contact for a GIS specialist working for the GIS Center in Brindisi. After introducing myself, my research project in an email, I inquired about the possibility for a fieldwork visit. He was very keen to help me. However, months went by as he was trying to negotiate access and in the end was eventually turned down. The Logistics Base is also a military NATO base with tight security measures. I was told that such an environment would simply not permit me as a researcher to visit, especially if they would have no control over my research. This presented too high of a risk. While there now exists a wealth of scholarship on the United Nations, the difficulty of my gaining access demonstrates how mapping and in this case the Logistics Base, had thus far not received much attention from the academic world.

Whereas I at least received a response from Brindisi, New York was a much more difficult nut to crack. Many emails, phone calls and even faxes remained unanswered. The summer of 2011 seemed endless

and I came close to thinking that this project was simply impossible to execute and I was beginning to run out of time. Finally, I had discovered the sites of mapping to investigate but they seemed to remain elusively in the shadows. The silence was deafening. In a last push of desperation I sent out a random call to some of my colleagues who also researched the UN, asking if anyone had any contacts in or was connected to the Cartographic Section in some way. And as if by a miracle, a friend in Germany had a personal friend who at the time worked there. As Yanow argues, "the language of 'case selection' implies considerable researcher control" (2012:70). At the time, I did not feel in control at all but at the mercy of my own stubbornness and a pinch of luck.

Finally, I had a connection, a way in. This contact was really helpful. He got in touch with the chief of the Section and within a couple of weeks my visit to New York was approved. However, again my role as a researcher presented some risks, which restricted my visit to a couple of weeks. Because mapping, particularly in explicitly political contexts, is under-researched, the mappers at the sites seemed unsure of how to deal with me. The mappers had not ever been visited by anyone, and thus had to grapple with what it meant to perform as research participants. They were unsure of the possible repercussions of my presence for them, their clients and for the organization at large. In spite of this ambiguity, I was allowed to visit them, and I left for New York in the middle of August 2011 nearly one year after I had returned from Timor-Leste.

At this point, since I was so grateful for having managed to gain access to New York, I had almost given up on visiting the GIS Center in Brindisi all together. However, once in New York, I told a member of staff about my troubles to be granted access. He happened to have previously worked in Brindisi and promised to look into it and make

some calls. By the time I got back to Edinburgh at the end of September, I had already received an email from the Center's current chief, informing me that my visit had been approved. Just two months later, I left for Brindisi in November.

The mapping world gradually emerged in front of me however, not as a mere world to be independently discovered. What emerged and what is inscribed in this thesis is based on the connections I drew and the relations I pursued. Practice combines and transcends the previous approaches to the study of culture and social life of mentalism, textualism and intersubjectivism (Adler and Pouliot 2011b:13). While practice approaches reject micro, meso and macro levels (Miettinen et al. 2010), they view the arrangement between local and global, between up and down, top and bottom as the outcome of practice rather than an *a priori* structure. The simultaneous emergence and learning about these sites *in situ* allowed for an encounter which kept its "landscape flat," where I did not *a priori* situate one or the other as "above or below" (Latour 2005:176). Rather, I followed connections, traced relations, fighting my way to the next point. What was at the forefront, and indeed what I had to rely upon was to be guided by how mappers framed this landscape, how they simultaneously create, explain and adapt to it, how they negotiated it in their everyday and how as a consequence a world emerged.

This emergence moreover does not take away my agency or that of the mappers in making the encounter with this life world happen. I fought hard and relentlessly to gain access, working different angles. Some of the mappers were very helpful in making it possible. In this sense, practice research is co-constructed world-making. Indeed the emphasis of contingency in relation to mapping does apply here as well. This world I describe could have been otherwise. As mentioned

previously this does not make it a relativist representation. This chapter lays out the decisions and justifications for its inscription. Moreover, given the silence on mapping in the literature on Peace Operations, I felt that being able to even identify sites where mapping happens and is coordinated and having been able to negotiate access seems like a valuable contribution. Having described the mapping sites, I will now outline how I sought to capture mapping practice.

Mapping Practice Assumptions (II)

The notion of 'data collection' seems rooted in ontological realism, a purely epistemological endeavor, inscribing a hierarchy between me as the researcher, and the mappers as research subjects, and their world as object. It seems as if one could pick data from a world out there, construct pieces of knowledge and thus a scientifically validated narrative or truth. As a researcher, I am, as is everyone else, a being-in-the-world, always already within it, in Heidegger's terms, and thus never separate. I am not above my research subject, with a bird's eye view, able to pull off some sort of 'god trick' (Haraway 1988). Mason thus re-terms data collection to data generation in order to highlight how as a researcher we are not only implicated in but are co-producers of our research data (Mason 2006). Embarking on the empirical program of practice (Miettinen et al. 2010) to me meant to make an honest encounter.

As Crampton stated in relation to the cartographic project, even from a historical perspective, one cannot say anything meaningful about lived experience by staring at it abstractly, (Crampton 2010:108). Thus an encounter requires meeting mappers, be amongst them, to be part of their life world. I sought to be amongst the "talk, bodies and machines" (Law 1994a:2) from which 'shared understandings' emerge and became contested. From a practice perspective this encounter requires two clarifications: First, as practice is definitively

"socio-technical" (Law 1994a:2), emphasizing materiality and the social, it is necessary to account for its agential status given in the encounter. Second, it demands a more thorough illustration of what is meant by practice in the encounter. More simply put, what is that we are looking at/for when investigating mapping as practice.

Materiality

Practice theory challenges and problematizes the concept of the social as merely relations between people. As mentioned, in the common definition above, practice recognizes materiality as essential components alongside humans. Thus, it opposes traditional humanist conceptions, which, according to the Enlightenment credos, elevate rational man as master over nature and cosmos. This echoes the conception of the map as a rational scientific tool to make the world ever more knowable, ready for strategic utilization. Practice, on the contrary, is always embedded in and mediated through materiality.

The question then however is, what is the role of materiality in relation to the social? More specifically, what is the role of GIS, and its technological bits, the hard-and software, in relation to the mappers and the users and indeed their bodies? This relates back to the kind of STS questions in relation to technology, which were outlined in the introduction to this thesis. In the practice tradition, Schatzki outlines two specific post-humanist challenges. As I will show, I situate myself in the middle for pragmatic reasons.

The first, objectivist research (Knorr-Cetina 2001; Pickering 2011) engages in understanding the role and indeed agency of non-human materiality and its influence and impact on practices. In Latour's Actor-Network theory for example, not only is materiality taken seriously but the principle of symmetry assumes its agency as

emerging from practices in the same way as human agency does. It is possible here, thinking for example of Callon's Scallops or Latour's bacteria[9], for material to act together with humans to produce a coherent voice. This is described via the concept of translation: to translate means "to express in one's own language what other's say and want, why they act in the way they do and how they associate with each other: it is to establish oneself as a spokesman" (Callon 1986:223). The investigation of materiality, its assemblages and acting in the world is therefore possible. And yet, as Schatzki argues, most practice theorists although recognizing the importance of materiality in constituting practices, still focus on the role of the human. For example, Adler and Pouliot who conceptualize practice ontology as the intersection of materiality, structure, agency and meaningfulness, still place at the forefront "practitioners as ultimate performers" navigating this intersection (Adler and Pouliot 2011b:15).

The other post-humanist challenge is the prioritization of practices over humans all together. Individuals and materiality are implicated in practices; however, it is practices which are the *a priori,* ontologically prior phenomenon. What Sandberg and Dall'Alba call "entwinement," particularly relates to my impetus of disassembling the map (Sandberg and Dall'Alba 2010). They argue that "we are always already intertwined with others and things as we engage in our activities and projects" (2010:1351). Again, Heidegger is evident here, via his notion of that we are 'always-already-in-the-world' never exist in separation to it. It also underlines the post-Cartesian, post-

[9] In 1989 Michel Callon lays out via the concept of translation how Fishermen and Scallops became organized in one coherent system, 'worked together' to achieve the domestication of Scallops in St Brieuc Bay in France. Latour describing the discovery of pasteurization accounts for the role of bacteria in the laboratory as playing a role in this process.

agency-structure position. It makes practice fundamentally relational, blurring the lines between elements.

Indeed, ontologically, I have already begun to conceptualise the map's leakages, its bleeding into its everyday materially mediated and embodied practices. As such, its material integrity is already compromised and as a consequence so is the integrity of the mapper. Agency from a practice perspective is fundamentally relational and emergent. Mapping implicates the mapper and the map in a relational constellation in which the boundaries become blurred. Whatever agency of the mapper, the map, space or technology described is thus always a product of the relational interaction. However, beyond acknowledging this relational socio-material ontology, I follow Adler and Pouliot's premise of practitioners being the ultimate performers. This has two reasons: First, practically, this ontology does not easily transfer to an analytical lens. Second, engaging with the mapmakers, as set out in the introduction, does not only represent an avenue to encounter with the relational socio-material world of mapping. Examining their understanding does work in itself by giving voice to a professional community whose work has thus far been absent from the political discourse.

Knowledge

The negotiation and translation of epistemological positions of the mapping and client communities is therefore crucial to understanding GIS as a practice. Knowledge plays a key-anchoring element in practice. Importantly, action, activity or behavior is not to be confused with practice. Looking at doings alone is not enough. Practice involves "several elements inter-connected to one-another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (Reckwitz

2002:249). Practice does not just involve interacting bits, such as bodies, materials, and space on an ontic level. In other words, it is not just an aimless clash of materialities in space. Rather, practice is a patterned organized dance or performance, according to rules and norms and a shared understanding of their interpretation.

There is an organization to practice which is underpinned by skill, competence and knowledge informing the interaction, (Turner 1994; Schatzki 2001; Mattern 2011). Practice particularly emphasizes knowledge. Tacit knowledge, à la Bourdieu's habitus (see 1977), is the kind of knowledge that is learned by doing and then internalized, manifested in routine and thus not what one explicitly articulates. One could think about learning how to ride a bike. After you have the competence and skill to do it, it is very difficult to actually explain, access this tacit knowledge, what riding a bike involves. It lies at the root of competence and skill and is that which becomes second-nature. Reflexive knowledge on the other hand is that which one thinks about and can articulate, thus being able to construct an account for one's doings.

In relation to maps, Pickles argues that "map knowledge is never naively given. It has to be learned and the mapping codes and skills have to be culturally reproduced" (Pickles 2004:61). Accordingly, in relation to mapping, practical understanding involves "know how to [map], knowing how to identify [mapping], and knowing how to prompt as well as respond to [mapping]," (Schatzki 2002:78). Mapping can then be understood as simultaneously tacit and reflexive: as a craft it is learned, becomes routinized and thus-second nature while its relational character, particularly in an environment in which it is not understood, requires reflexive articulation. From a practice perspective then, tacit and reflexive knowledge "combine in

the innovation, evolution and execution of [mapping] practices" (Adler and Pouliot 2011b:24).

Mapping as a practice "has its own logic (pragmatic purposeful), its own standards of knowing (interpretive, moral, emotional), and its own image of society (as a constellation of independent communities)" (Cook and Wagenaar, 2003:141). Therefore, knowledge that is specific to mapping, which is implicated in this practice, forms a community of those who are competent performers of it. For Wenger (1999) a 'community of practice' shares a domain, a common concern which allows members of the community to interact on the basis of these concerns. However, for him this community does not have to be formalized. One could even belong to a community without knowing it. Communities of practice are not necessarily tied down by geographic location, or by states and borders. Because what ties them together is what they do, communities of practice can be truly trans-national (Adler and Pouliot 2011b). What ties the community together is the "repertoire [of] shared resources" such as expertise, skills and tools (Wenger 1999:89). As a result, a focus on practice lets the community emerge as well as the structure which it produces.

It is evident how mapping fits this description and allows for a focus on practice as a starting point rather than analyzing the organizational structure in which mapping takes place. The epistemic foundations of a community, not just know-how but also the frame of reference to understand the meaning of mapping echoes again Autesserre's 'shared understanding' and Rubinstein's 'professional culture.' It is important to tease out two dimensions of knowledge as anchoring the mapping 'community of practice.'

First, the map-making community is always inter-related with its client community. At the UN, the mapping community serves the

political community; that is other UN agencies, by producing and providing them with maps. Thus, the concerns of mapmakers and the socio-material environment in which they map does not exist in isolation. Second, the knowledge or 'repertoire of resources' that connects mapmakers is not completely homogenous or uncontested but too requires negotiation and production. In other words, what forms "background knowledge" – partly tacit, partly reflexive - does "not create uniformity of a group or community, but organize[s] their differences around pervasive understandings of reality" (Adler and Bernstein 2005:296). Mapping as practice is at stake within its own community while it is also situated within larger "constellations of practices" (Wenger 1999), such as Peace Operations planning for example.

Knowledge negotiation and transfer occurs on two axes then: Horizontally within the mapping community mapmakers negotiate their interactions with each other and mapping materials. This is horizontal because they represent a community bound by a shared understanding of mapping. They have access to the same vocabulary, similar training and the same system of meaning. This meaning however still requires production through practice. Vertically GIS practitioners have to communicate the map to their clients. GIS practitioners in their own modus operandi, their own orientation towards the world and 'understanding' produce geographic information and maps for their clients who are part of other communities of practice. This occurs on a vertical axis because the interaction between these communities does not represent a mere knowledge 'transfer.' A process is required in which knowledge is translated from one framework of reference and made meaningful into another. As Freeman argues, a practice framework is necessary to understand this translation work as such an understanding "depends on some intuitive, creative (artistic) act[s]" (Freeman

2009:440). Quoting Steiner, he states, "at best we have narratives of translational praxis" (Ibid.).

The point here is not to inscribe a separation but to pay attention to how different communities emerge organized around ways of understanding. A practice perspective allows for a lens to investigate how these communities interact with one another, how their knowledge is translated and how boundaries are re-enforced or smudged. Rubenstein's notion of 'inter-operability' is not an *a priori* question which can be answered by deducing from a fixed professional culture but emerges through negotiation and everyday interaction.

As mentioned, as a researcher encountering this community situated in the material life world is too predominantly framed by my interaction and communication with them. As such, it is their "accounts of lived experiences" which provide a key carrier of meaning (Adler and Pouliot 2011b:14). Language as a discursive practice, "saying is doing" after all (Ibid.), provides an avenue to capture tacit knowledge via its reflective articulation. As Bueger states, in combination with being there and experiencing practice, talking to practitioners often remains the only strategy (2011a).

As purposive action, which can be enacted and talked about, mapping is rendered meaningful. Constantly at stake, meaning emerges through practice. For example, as Rouse demonstrates via MacIntyre: "'if I am a Jew, I have to recognize that the tradition of Judaism is partly constituted by a continuous argument over what it means to be a Jew'". So what is at stake to be a Jew is not settled but is at stake over and over again in the practice (Rouse 1996:531). What mapping is, what it means to map is constantly re-negotiated in its everyday.

Focusing on this everyday level of mapping, i.e. how GIS specialists and cartographers at the UN go about their work, raises several questions: How do mappers know how to map, how to identify mapping, prompt and respond to mapping? What is at stake here, contested, negotiated and contingent? How does one become a mapper or at what point is one considered as such? On the other hand, how do they interact with clients who are asking for maps but do not operate based on the same 'practical' understanding'? How do they negotiate their work with people whose practices are rooted in different knowledge sets, different skills and embodiments? Do boundaries emerge in this process delimiting the world of mapping? How does this impact the use of GIS, its role and possible political effects?

Investigating mapping as practice then *hooks into* a range of other questions – indeed, as Cosgrove argues, "mapping is not restricted to the mathematical; it may be equally spiritual, political or moral" (Cosgrove 1999:1, 2). The way in which mapping is understood is bound up in the practices of its producers and users. How the understanding of mapping is constituted, how it is negotiated and produced, and how it is translated and made meaningful in other contexts represents the focus of this thesis. Indeed, the extent to which this translation is successful; in other words, the extent to which a particular understanding is shared; has political implications. As Freeman states, it is "not merely [about a] 'carry over' but [about the potential] take over" of meaning which relates to the production of political effects (Freeman 2009:434). Reiterating the journey of the cartographic literature, the conditions of possibility of mapping, as "'unfolding action'" (Dodge et al. 2011a:23), are reduced from first, the mere focus on the artefact, then the focus on its situatedness and historicity, to its everyday existence. What is regarded as the lowest common denominator poses much larger

questions. Reframing the politics of mapping into its everyday negotiation opens up spaces of contingency.

The Nature of Encounter

Having laid out the status of materiality and the relational knowledge-centered character of mapping as practice, this project is necessarily qualitative, interpretive, reflexive, embraces an 'ethnographic sensibility' (Pader 2006) and an abductive research strategy. It is these which inform my mode of being in the field and mode of sense-making during my analysis and writing up. Interpretation is required since I was not looking for facts about mapping as a practice. Rather than looking at the specifics of the linear map-production work, I looked for narratives and sense-making of the mappers themselves, and the ways in which they negotiate their work in the everyday. Coupled with being amongst them, listening to and participating in their chat and banter, seeing them in their own environment, and somehow becoming part of that, provides an interpretation of this world. Abduction informs this level of interpretation:

Once the area of interest is identified, in this case mapping,

> "we start collecting pertinent observations and, at the same time, applying concepts from existing fields of our knowledge. Instead of trying to impose an abstract theoretical template (deduction) or 'simply' inferring propositions from facts (induction), we start reasoning at an intermediate level (abduction)," (Friedrichs and Kratochwil 2009:709).

Recommended by Yanow (2012) and here closer defined by Friedrichs and Kratochwil it is called a pragmatic or common sense strategy. I would refer to the desire for honesty. My sense-making process is of course informed by what I already 'know,' such as the critical cartography and GIS literature I have read, or my background in peace and conflict studies in which I received my Masters degree. I

am constituted by an education in critical approaches, interested in politics. In peace and conflict studies this meant analysing Peace Operations, excavating their assumptions and effects. In many ways they have been coined as oppressive operations of empire, as was the case in Timor-Leste. And as we have seen in the first chapter, the representational politics of the map and the positivist Western epistemology in which it is couched has the potential to work in the interest of the few, thus exhibiting neo-colonial potential.

This type of critical analysis also came with a sense of frustration. To me it often seemed to close off politics too quickly. The route to 'emancipation' too often leads through the disclosure of the structural machine of empire. As a consequence empire necessarily frames agency, whether the practitioner in Peace Operations or the mapper in cartography as complicit. I was uncomfortable with such evaluations. I was interested in opening up spaces for agency, and contingency, rooting conditions of possibility in a lens honed on the everyday. Thus, in declaring my academic positionality, my critical background central to my education, now represents an *awareness* in my interest in politics. My focus however is characterised by the logistical lens looking at how things work, highlight contingent spaces and understand the production of effects. It goes beyond examining assumptions in philosophical contexts and extends into the everyday.

The introduction and literature review thus almost represent my background, evolutionary lines of thought which I brought to the field. I am not a neutral receptor open to receive truth. But neither am I an impositor of what I already know. My sense-making process therefore operated at that intermediate level, oscillating between my own conceptual background, i.e. maps always represent the possibility for political effects, mapping as practice, and the openness

to see, to learn, to let the world emerge with me in it. This outlook follows Sørensen's impetus – outlined in the introduction – of striking a balance between engaging critically with technology while simultaneously allowing for space to be constructive about its use.

This encounter with the life world of GIS mapping at the UN required a mixed methods approach to enable me not only to 'see it' but to facilitate my immersion in it and to capture the mappers, maps and the world. In all sites I conducted semi-structured qualitative interviews, participant observation, artefact collection and analysis. These three methods sought to capture at different registers the tacit and reflexive knowledge and situated interactions as the relational glue between GIS technologies, mappers and clients. Artefacts are not exclusively maps but also documents which comment or stand in relation to the practice of mapping. Although what the methods entailed differed across sites, due to access, time and scope, they all fit within the sensibility outlined above.

As stated, the sites of the mapping world only emerged gradually via my pilot fieldwork in Timor-Leste. As such, this first fieldwork trip has a special status in that it began to frame my research design to direct specific focus on the mappers. Before elaborating on the use of the three methods mentioned and what they entailed at the Cartographic Section and the GIS Center, I outline my stay in Timor-Leste to give some more background to the emerging questions.

Piloting Timor-Leste and the Emergence of UN Mapping sites

During my three and a half weeks in Dili, the capital of Timor-Leste, I arranged interviews with as many stake holders as possible (in the end I had conducted over 30 interviews) while having informal conversations with people I met in social settings. At this point I had

not decided to use the UN as an institutional case study, since I did not know about the mapping sites within it. Finding the hook, to connect the Brahimi Report statement on GIS with GIS practices in Timor, was the goal of this pilot.

During my time there I lived with Tracey Morgan, the honorary consul for the UK. I found her again, via detective techniques, sending out a query on academia.edu to scholars who had done research in Timor-Leste, asking them about their lessons-learned and tips. Tracey therefore presented my first hook into what would emerge as a web of relational practices. Organizing weekly pub quizzes at the Hotel Dili, and having lived in Dili for a long time, Tracey was very well connected, and always keen to provide me with contact numbers and make inquiries as to whom else I might speak to. Only a couple of flights per week arrive in Dili, which makes new arrivals always talk of the town. Dili is also a rather small capital where word of mouth travels fast, especially in the international expat community. In all of these ways, snowballing developed fast and organically.

Recruitment and Interviews

The interviews I conducted in Timor-Leste too were of a scoping nature. The goal was to find out who in the peace operation stake holder constellation used maps, did mapping and to what effect. Broadly, I was interested in: What role did maps play in gaining any spatial knowledge of the country? And how did this knowledge relate to decisions made for maintaining and building peace? I spoke to all sorts of local and international NGOs, governmental ministries, aid organizations and UN organizations. I had prepared scoping questions framed on three insights: one, my background in peace and conflict studies, specifically Peace Operations; two, my knowledge on GIS gained from the introductory course at the University of

Edinburgh; and three, my immersion in the literature of cartography and GIS studies. They were separated into two parts: Part A focused on the connection between maps and decision-making while part B focused more on the technical and methodological questions:[10]

Excerpt from Field Journal (November 2010)

Part A)

- What projects are you currently working on?
- What is your vision for the implementation of this project?
- Do you work hands-on with GIS (or other maps/mapping technologies)?
- What in your view does GIS contribute?
- Do you feel that there are any ethical concerns in the use of GIS?
- Do you think of it as a valuable technology for Timor-Leste's transition to sustainable peace?
- Have you encountered any problems with the technology?
- Have you experienced any resistance to its use or the outcomes produced within the local and/or international community?
- In terms of the projects you are working on, how do you see their progression in the future?
- Where do you see Timor-Leste in the next 5-10 years?
- What do you perceive as the major obstacles to its progression/transition to sustainable peace?
- What do you imagine a sustainable peace to look like in Timor-Leste?
- Where if at all do you see a role for GIS in this?

Part B) Methodological Questions:

- Who is involved in model development following these steps: from reality to conceptual model to logical model to physical model? How is this done?

[10] These questions were derived from the introductory GIS course I had audited. I hoped that if I immersed myself in the GIS language I would be able to make connections with specialists more easily.

- What type of modelling do you do? Inductive (descriptive), deductive (explanatory), or normative (seeking potential for project goal)?
- What kinds of ontologies do you create?
- What methods do you use for data collection?
- What types of analysis do you do? Mathematical, experiential, correlation, causation, continuous space, discrete objects, raster, vector?

What I encountered on the ground was more silence around maps. Interestingly, I never really got to ask any questions from part B. And in regard to part A my questions were often met with mere confusion. The conversation level required conceptual grounding in order to achieve comprehension. 'This is what we are doing' was possible to get at whereas 'how we are doing it' at a very logistical level was much more difficult. This mirrors the literature in that maps purporting a spatial imagination are so normalized that talking about them reflexively seems quite literally beyond the thinkable. For example, I was told by La'o Hamutuk, one of the most influential local NGOs that, if I was going to produce research on Timor-Leste, I should really deal with the pressing questions, such as what the impact of the government's proposed economic reform will have on the population at large. Why on earth would I spend my energy on questions of space and maps? What I was after seemed somewhat elusive and was met at best with head tilts or head shaking. Still, most interviewees were uncomfortable being recorded. So there seemed to be something at stake. Although snowballing worked well in terms of scheduling interviews with key stakeholders, a week and half into my stay, it seemed difficult to gain pertinent insights to my questions.

However, while some of these conversations were frustrating, as my questions on the one hand seemed to cause confusion and on the other seemed to make people uncomfortable, in the latter half of my

stay I finally made some headway. Moving from the people supposedly using maps to those who produced maps made a huge difference in the quality of interviews. While it took me a while to find mappers, lurking in the shadows of the political assemblage of a peace operation, my questions finally gained traction. Projects on land rights and distribution, violent incidence tracking, administrative boundary delineation and disaster management all had staff who either knew about or worked on mapping. But it did take some digging to find them. For them, questions on data collection, sharing, integration, storage and management, and visualization were of huge significance. More strikingly however, these questions were not only considered political because of the effects that their decisions may create.

Their concern for politics was not merely tied to the representational and material limits of GIS. Rather, what was of greater concern was the relevance, indeed, the sheer possibility of mapping. This was contingent upon their ability to translate mapping work into the kind of work their client did. As set out above, translation is not mere transfer of knowledge but requires the 'making meaningful' of mapping in another frame of reference. Did political projects use maps or know how to use them? Were political agencies aware of or did they care about the services mappers provided? Did they have the necessary infrastructure and did it work? Here we can see the map's politics leaking into its relational materialities, contexts, negotiations and translations beyond its representation. A 'shared understanding' does not necessarily extend from one professional community into the next. Indeed, technology is not a mere extension of, or a tool, enabling peace operation. Its success is tied to the translation and proliferation of its 'shared understanding.' These processes, as the following empirical chapters demonstrate, is central to the understanding of GIS mapping in UN Peace Operations.

As I mentioned previously, during my time in Timor, a GIS week was held in the Europa Palace in the Dili town center. This event was all about maps. A huge map of Timor-Leste covered the floor while exhibition stands covered the walls, with all sorts of thematic maps of Dili and beyond. Every day talks were given by mappers engaged in particular projects. Mostly they spoke about what their projects entailed, from their aims, to execution and outcomes. However, all of them talked about how much they wished GIS would feature more in the development of Timor-Leste and how much they were frustrated with the lack of data coherence and integration and how much the state of the IT infrastructure inhibited proper use. Here, specialists hailed GIS as a technology that held the potential of great salvation, stifled by its underuse and the lack of awareness by policy staff. Interestingly, the organizers of the GIS week were frustrated with lack of attendance by political agencies. The mappers I encountered in Timor had the same experience I had – a lack of understanding.

Attending the GIS week everyday contributed to my submergence into its world. Mappers began to be aware of my presence in Dili. And indeed, while I had problematic experiences with political staff in interviews, mappers on the other hand really wanted to help me out. At times it felt like I was taking on their case, like I was giving them a voice. As I moved from project to project I found myself connecting people, telling them about other projects I had encountered. My presence there affected the world of mapping. I did not only draw relations which are now represented in the thesis but I too drew relations and made connections 'in the field.' This again underlines the world-making character of research.

Interestingly, during my time in Dili it took longest to get in touch with the local GIS Unit attached to UNMIT, the current UN mission. And indeed I spent only a very short amount of time there. Security is

rather strict, so the chief of the unit had to sign me in. It was pretty clear from the outset that they were under-staffed and very busy. The interview was thus rather short and again I was not able to record it. As mentioned previously, I did get more of an understanding of the overall GIS infrastructure within UN Peace Operations. During a conversation with staff at the GIS unit in Dili, I learned more about whom the field unit communicates with within the UN. I learned about what seemed two important sites: the GIS Center at the UN Logistics Base in Brindisi, Italy and the UN Cartographic Section at the New York Headquarters. Thus the world of GIS mapping became constructed through the process of my fieldwork, through the encounter with mappers.

My pilot investigation of the GIS world in Timor-Leste yielded two important findings for my research design: First, it became more and more evident that my questions (Part A and B) did not translate for policy stake holders whereas they were deemed of huge importance by mappers themselves. Second, the interview with the chief of the GIS unit from UNMIT, revealed an institutional infrastructure of GIS use at the UN in the context of UN Peace Operations. GIS units in the field, the Cartographic Section in New York, and the GIS Center at the UN Logistics Base in Brindisi represented the corner stones of a GIS world I would investigate. Thus, the data generated from this pilot study holds a special status in this thesis. The next chapter (chapter four) dedicated to Timor-Leste illustrates the epistemological fault between mappers and users underpinning GIS mapping practice in the field. It therefore acts to problematize the notion that GIS mapping is merely available for operational use, and its political effects ready to be assessed.

Access and Consent

In both New York at the Cartographic Section and Brindisi at the GIS Center, I had an initial meeting with the current chiefs. Both were not only sympathetic to my project but deemed it of significance to their own agenda, namely to raise awareness about mapping within the UN and advertize its important contributions to peace missions. Indeed, once I got in touch with them I already got an impression of their vulnerable position within the larger political organization that is the UN. I was given 'full access' with the permission to arrange interviews with all staff and a desk at which I could work. The chiefs asked staff to make time at their convenience to speak to me. Recruitment at the sites was therefore straight forward, as the staff represented the pool of interviewees. Everybody was happy to sit down and talk to me either in the formal interview setting or over having lunch or coffee.

I stayed for full work days at the GIS Center, where I could wander the halls, hang out in staff offices, go for the routine morning espresso and have lunch together in the canteen on base. I received a security pass allowing me to enter the base every morning. For the week and a half I was in Brindisi, I quickly became a colleague, coming in to work and leaving at the same time. At the Cartographic Section, I did not have the same access since I had not been granted a security pass. I arranged for several interviews at a time, spending either mornings or afternoons in their offices. Staff had to be notified to pick me up at the entrance and sign me in.

At the beginning of each interview, the members of staff were given an information sheet which gave an overview of my project. I informed them that the data from the interview would flow into the thesis in an anonymized fashion. After reviewing the sheet, verbal consent was established. I also suggested that if they had any questions or hesitations about the data or the project they would be

welcome to get in touch. Further, I would run by them any sections where I quoted them at length.

Window into the Cartographic Section

The Cartographic Section is currently situated in a rented open plan office on Madison Avenue in New York. A lot of UN offices are currently spread out across the city while the UN One Plaza is undergoing refurbishment. It shares a floor with other departments. In fact it is a rather small bit with cubicles, the chief's office and his secretary as well as a little conference room. Maps are all around, on desks and walls. GIS specialists and cartographers are looking at their screens, talking to each other on the phone. Particularly walking around in the Cartographic Section it is evident that what constitutes mapping work is more than just map production but administrative work, negotiations with clients, and management of staff and equipment. I was allowed to use one of the desks and conduct my interviews in the conference room. Sometimes members of staff brought in lunch, or I went out with them individually to grab something to eat or a coffee. Because I did not have the same security clearance as in Brindisi, my participant observation was more limited. And yet, I got to spend valuable time in formal and informal settings with them, listening to their banter and negotiations, interacting with one another, getting an idea of how they operated and constituted that world around them.

Breaking the Silence and Walking the Shadows

Conducting Interviews

Mappers are experts in mapping. Being a GIS practitioner or Cartographer is a profession. The notion of practice suggests purposive, routinized, skilled activity. Creating a map is just that. Experts are those who have an institutionalized competency to construct reality, (Hitzler 1994) they are characterized by their ability

to (at least in part) assert their world view, (Bogner and Menz 2002:46). But what defines the community of mappers is practice, (Wenger 1999) where what draws them together is what they do. They do something nobody else does. Mapping is distinct from the political context of Peace Operations and yet implicated as being part of Peace Operations. As such, interviewing experts from a practice perspective, directs the focus on excavating the meaning of that competency, that knowledge, and skill in their everyday and how that is negotiated within the context and purpose of building a state in Peace Operations. It does not assume that they simply have the ability to construct reality but that they are engaged in that task. How and to what extent is what is of interest.

I conducted ten interviews in New York, eight with members of staff of the Cartographic Section and the rest with two of their clients. Most of these lasted an hour, some significantly longer. The longer ones usually entailed more detailed explanations of technical details. These however I tried to place within the context of 'technicity', i.e. their relation and sense-making of it not as mere technology but as situated within the context of Peace Operations serving a client community. The client interviews were with a member of staff from the Office of Genocide Prevention and one from the Office of Maritime Law in United Nations offices in New York. They worked with the Cartographic Section when they needed maps for their own work. As much as I would have liked to talk to more clients the temporal scope of the fieldwork as well as the difficult process of negotiating access did not allow me to recruit more interviewees. In Brindisi, I conducted six direct interviews with members of staff, in addition to my everyday conversations. Not very many interviews were recorded for two reasons: some of them happened casually while some members of staff were not comfortable being recorded. However, during all official

interviews I took extensive notes which I then typed up immediately afterwards.

Interviewing the staff at these sites represents one way in which to encounter the mapping world. It is they who *work* in the shadows and whose voices have not been heard. At both sites I conducted semi-structured qualitative interviews with most members of staff. Conducting interviews from a practice perspective, first and foremost, starts with the question: What is it that you do? In this professional environment of the GIS Unit in Dili, the Cartographic Section in New York or the GIS Center in Brindisi, what staff do is considered their everyday work, part of their career, part of their identity. They are GIS specialists and cartographers. And as with every job, theirs too come with challenges, struggles, setbacks, achievements and successes. The question of what one does in the everyday is therefore not merely a technical question but also an emotional one. This was particularly evident in the responses I received from my initial pilot interviews in Dili, where GIS staff seemed almost elated to be asked questions about their work in political contexts. They themselves were painstakingly aware of their situation in the shadows of political work and their constant struggle to make themselves heard. Thus, for them, their work was what was at stake, the promotion and proliferation of what mapping means represented their task. Acknowledging this vulnerability in conducting interviews with staff about their *work* required an appropriate conceptualization of the interview.

As McCoy argues, it is this "everyday world of working in which we are located, in our bodies, and which we 'gear into' through our purposive actions." It is the "practical activities of everyday life in a way that begins to make visible how those activities gear into, are called out by, shape and are shaped by, extended translocal relations

of large-scale coordination," (McCoy 2006:110, 111). The concept stems from the context of institutional ethnography, thereby aligning with the 'ethnographic sensibility' of practice mentioned previously and which I will outline in the next section on participant observation.

The 'gearing into' relates to the work context, that is, the people and things one works with and the institutional context one works in. Mapping work at the Cartographic Section and the GIS Center 'gear into' working with colleagues, with clients from other UN agencies who request and use maps and the overall organizational context that is the United Nations. Importantly, while the organizational context matters, from a practice perspective, it does not gain definitive structural explanatory power. In other words, while mappers of course are aware of their institutional situation, it is their practices which in the everyday co-constitute or contest these.

McCoy develops a set of questions which guided my practice-based interviews with the cartographers and GIS specialists as they represented appropriate realizations of my research questions for the field:

- What is the work that these informants are describing or alluding to?
- What does it involve for them?
- How is their work connected to the work of other people?
- What particular skills or knowledge seems to be required?
- What does it feel like to do this work?
- What evokes this work?
- What are the troubles and successes that arise for people doing this work?
- How is the work articulated to institutional work processes and the institutional order?

These questions make evident that what is already entailed here is a level of interpretation. It is not merely about the description of work in itself, describing the ontic material dance, but digs deeper at its meaning. Meaning is what makes this type of interview an emotionalist "heuristic device" (Roulston 2010:51). Here the interview is conceptualized as "one in which genuine rapport and trust is established by the interviewer in order to generate the kind of conversation that is intimate and self-revealing," (2010:56).

This may seem odd, pertaining to Cartographers and GIS specialists. However, I argue that talking about one's work is intimate and self-revealing. One's professional career is implicated in one's personal life in all sorts of ways. What one does, day in and day out, how one negotiates one's work life is intimate. We spend most of the time of our weeks at work, where we interact, struggle, fail, and succeed. Talking about that is talking about one's life. It 'gears into' a sense of worth, accomplishment, failure, and struggle. As a researcher asking questions, one plays an active role in "produc[ing] in-depth interpretations of participants' life-worlds" (Roulston 2010:57). As pointed out in the previous chapter, mapping is not merely about the mathematical or the technical but about the political, the ethical and the spiritual. Thus, it is this life world that is at once part of and produces mapping as a practice.

Although the interviews are not about excavating "true confessions," they definitely require trust (2010:56). Since the Cartographic Section, the GIS Center and the GIS Units provide specialist services to political agencies such as the UN Department for Political Affairs, or the Security Council, talking about their work for the interviewees exposed their position within the organization. For them, talking about their work puts their work at stake. It is not however about seduction, trying to tease out the secrets of this work world. However,

it also rejects the assumption of the detached, neutral, neo-positivist researcher and thus cannot make a "claim to be objective" in the neo-positivist sense, (2010:57, 58).

These questions however, argues McCoy, are just a first step in a two-pronged strategy. Reporting their interpretations of their work merely represents just that, their interpretations. However, a balance needs to be struck between these stories and accounts and what they "hook into." All stories 'gear into' larger networks at play which reveal a set of politics at play, again playing towards the deeper level of interpretation and analysis. This relates especially to knowledge. What is at the heart is how mappers and their work are understood. These negotiations, translations and proliferation processes give meaning to the institutional organization of mapping, which in turn enables or constrains mapping. These are the contingent spaces I represent in the following chapters, based on an encounter with and immersion in this life world.

Conducting Participant Observation

I walked the shadows of the mapping world in the 'here and now' at multiple sites observing practices, body movements, and interaction with artefacts. In the shadows I became part of the evolving organism, 'the creative, reflexive, playful, tactile and habitual practices, as well as the knowledge, experiences, skills and performances' (Dodge et al. 2011b). The goal of a multi-sited ethnography however is not a

> "holistic representation, an ethnographic portrayal of the world system as a totality. Rather, it claims that any ethnography of a cultural formation in the world system is also an ethnography of the system, and therefore cannot be understood only in terms of the conventional single-site mise-en-scene of ethnographic research [……] the politics and ethics of working in any one reflects on work in the others," (Marcus 1998:83, 98).

It is through encountering mapping that New York, Brindisi and Timor-Leste are connected. The map is a "vehicle" through which the life world of mapping is connected, a way in which to follow activities, actors and listening, (Yanow 2000). Participant observation, being party to the practice of mapping "brings you especially close to the data. You watch it being generated and you collect it at the source. It is not received data," (Fenno 1986:4). The notion of proximity therefore sets a counter point to what mapping ought to entail; it enriches, problematizes the linear production process. It allows for "immersing oneself and being there" and enables "appreciating, understanding, and translating the situated, temporal, creative, interpretive and above all moral and committed nature" of mapping as a practice, (Nicolini 2009:134, 135).

However, proximity in the 'here and now' from an interpretive 'always already within the world' stance, has two implications which require elaboration: First, it gives significant agency to the mappers, impacting research design which consequently, second, impacted my own positionality and constitution as a researcher. Let's take each of these in turn: As I have outlined above, my relationship with mappers was one of respect and trust. I was a visitor to their world, not a more superior observer. As Yanow aptly points out:

> "Rather than being research 'subjects' who participate in (positivist) research on the researcher's terms, in interpretive research it is the researcher who participates in the local's activities, in their setting, on their turf [...] This means that they are understood as having the power to affect research designs actively in various ways" (Schwartz-Shea and Yanow 2012:73, 74)

It is the encounter with their world, their narratives, and their modes of being, which shaped my continuous inquiry into it. The data presented in the empirical chapters, the contingent geographies are therefore theirs and mine. They represent a co-construction.

In New York as well as in Brindisi, it was particularly the narrative and feeling of mappers of not being heard, not being taken seriously or not being used enough by political agencies, which shaped my drawing of the contingent spaces. As I mentioned previously, my initial questions represented their everyday frustration: how is spatial knowledge produced in Peace Operations? What does nation-, state-, peace-building mean spatially? And what are the roles of maps in this? They felt that they represented possible answers to these questions, indeed offered services and solutions but were not taken up enough or side-lined as merely technical support. Their work was seen as separate from and sub-ordinate to politics. As logistics they were there only to be drawn on when operationally necessary. Not only my perception of mapping as a shadow world but their own perception of being situated at the margins broadened my conceptual inquiry. For example, creative, playful and habitual practices, as articulated in Dodge et al's onto-genesis, or as Freeman refers to in terms of translation, extended into their interactions with current and prospective clients. Understanding mapping as a practice entailed looking at ways in which they make themselves heard.

However, this intimate encounter with 'lived experience' as in Crampton's call for ontology and my immersion into this world made their lived experience also mine. Indeed,

> "participatory research provides people with the analytic and practical tools to document their lives and offers a language for articulating the unique strength of a group [...to] ensure that the voice and expertise of our constituents are not lost in the effort to achieve scientific validity," (Davis 2006:233).

The congruence of my questions and their struggle made giving them voice almost a normative imperative. The rationale for this project therefore influenced my positionality, my "situational role" (Yanow 2009:287) in the field, in that I was somehow implicated in their

struggle, in their situation in the shadow, in their silence. I was the one to shine light on them and the one to give them a voice. I feel it is necessary to make this point strongly, as this congruence was such as surprise. Yet, it is also important to make the point equally as strong, that this immersion, although it led to a deep understanding of the struggle, did not make me its bearer. It did not become my struggle. This acknowledgement of the struggle not only highlights contingent spaces but also informs the balance I set out to strike between being simultaneously critical and constructive.

Another way in which immersion and proximity changed my positionality was in regard to my own knowledge of GIS and mapping. As mentioned previously I am laywoman in GIS which meant that asking about and witnessing their work also meant learning about it. It meant learning the language of mapping, the intricacies of production processes as well as what is at stake in mapping as work. In the process of talking to GIS specialists, I too became transformed. Yanow and Schwartz-Shea point out that one's intersectional position, one's characteristics "can profoundly affect what researcher sees or does not see, learns or does not learn" (Schwartz-Shea and Yanow 2012:68). Indeed, interpretive research represents "successive phases of learning" (Schwartz-Shea and Yanow 2012:73).

This too is true for one's level of knowledge and its effects. The more I was able to understand their work, the technical aspects of it, their everyday situatedness, the more I felt assimilated. Especially in Brindisi, I felt I began to be able to anticipate problems in explanations and be able to frame them in the right language. This too brought them closer to me as well. It seemed they felt understood and appreciated by the attention they were given. My being there seemed to validate how they felt about their work, as important, particularly politically. It connected them closer to each other,

strengthening their identity against the outside, i.e. other UN agencies. However, making mapping as a purposive action the topic of analysis also exposed disagreement within their community. This relates to the horizontal negotiation within the mapping community as the production of meaning, even within the same frame of reference, is always at stake. And yet, in spite of the ways in which I was immersed in this world and the effects this immersion had, my position remained that of a social researcher rather than becoming a GIS specialist myself. I did not begin to advocate for their struggle or mediate between them.

One of the limits of using participant observation as a method for this research project was time. As Alvesson and Skoeldberg argue, participant observation "is demanding of both time and resources" (2009:87). Usually, it entails spending a substantial amount of time at the site, to ensure proper exposure. And although, as I mentioned earlier when relaying the effort it took to gain access, it took a huge amount of resources, mentally, emotionally and financially, I was unable to spend a 'substantial' amount of time at the different sites. This is why I feel more comfortable terming the undertaken research as following an 'ethnographic sensibility' rather than a fully-fledged anthropological ethnography. Particularly in disciplines such as international relations, it is uncommon to spend vast amounts of time on fieldwork in comparison to sociology or anthropology. Yet, in spite of the limited time I spent in Timor-Leste, New York and Brindisi, my fieldwork generated a sufficient amount of data. Although, fieldwork could be endless, I felt I had reached a point of saturation. Saturation is defined by hearing the same themes, gaining the similar insights or hearing the same names continuously, given the area of interest (Yanow 2009:285). Having been to a field mission, the strategic headquarters and the operational base and having interviewed most staff, a point of saturation was reached.

Window into the GIS Center

In Brindisi my access and thus participant observation allowed me to immerse myself more into the mapping world. I lived in a hotel about 20 minutes away from the NATO base. The hotel was occupied by other UN employees who were there for training sessions. I was allowed to ride to the base with them every morning on the bus that had been chartered for them. Standing in line, chatting about UN work across the world, we waited for our daily security check to enter the base. The base is fairly big and the GIS Center, counter to what its name might infer, is tucked away in a small square building. Only a small sign right by the door tells you that this is the where it is housed. Inside it looks like any other office, with one white hallway splitting into offices on either side. Maps hang on the wall and there is also a mission statement next to the chief's office. In the offices, GIS specialists are chatting or looking at two screens extracting data from satellite imagery. Every morning at about nine o'clock we all go for the routine espresso. People take turns in buying rounds. During lunchtime we walk across the base over to the canteen where NATO soldiers stand in line for their grub. The military environment is quite a different feel from the high politics of New York. Here we have the informal chats, talk about work, the everyday challenges and difficulties.

Mapping Contingency

Data Analysis

My fieldwork finished by the end of 2011. At the beginning of 2012 I began to organize the data from each site into three fieldwork reports for supervision meetings. These consisted of a variety of notes: Full chunks of text I had written up in the field summarising my thoughts about what I had experienced during the day or week, observation notes of what I had seen, and notes from interviews and conversations, most of which were in bullet point form. The notes

were separated by encounter, that is by the meeting with a particular member of staff or event, noting down name, time and location. The fieldwork reports were thus not yet anonymized. However, through the stages of data analysis they were kept safe in my office and only my supervisors had seen the raw data. The empirical data presented in the written up form in the following chapters, have since been anonymized. In the process of organizing the data into these reports, I began to have a first glance at an overview of all generated data from the field.

Moreover, during the fieldwork I had collected two types of official documents: UN internal documents and brochures and organograms for public consumption. Most of these, whether internal or public, were provided to me by the research participants themselves. They used them in interviews to illstrate their work. The internal documents are PowerPoint slides (see chapter 6) prepared by mappers for workshop purposes with their clients in order to explain the utility of their work. The other brochures and organograms (chapter 4 and 6) are public and explain either specific projects (such as economic development project in Timor-Leste) or the institutional organization of GIS use (such as of the Cartographic Section in the Logistics Division). I have collected and organized these documents in the same manner as the interview data. I noted from whom and when I received the documents and in what context they were used by the participants to make a point in the interview.

Importantly, I don't want to suggest that interpretation or analysis only occurs post-field work, during the 'desk' period. Not only does the organization of data blur lines with building interpretation (Mason 2006:148); interpretation also already happens in the field. As Yanow argues, three interpretive 'moments' or I would say phases, flow into generating and working with data: The first 'belongs' to the

mappers and their accounts of mapping work based on their "first hand experiences" (Yanow 2009:278). This is represented in the direct notes I took from the interviews and conversations. The second refers to my own interpretation of my being with the mappers in New York, Brindisi, or Timor-Leste, observing, talking and participating in their interactions. These are represented by the comments and thoughts I jotted down in my fieldwork notes, annotating information, circling, underlining, questioning and beginning the sense-making process. The third moment then occurs at the "desk," having moved away rather than out of the mapping world, recollecting and drawing on this experience, re-reading and organizing the generated data (Yanow 2009:278). Of course, these are not pure, mutually exclusive phases or moments. As outlined above an abductive strategy not only recognizes but utilizes the background with which one comes to the field. There is a constant oscillation and on-going process of sense-making. This however extends into the reading and writing up phase; thus, they too should both be considered as methods of discovery and sense-making, intrinsic to the process of analysis (Yanow 2009:280).

Written up, the data took the format of partly full text and partly bullet points. The volume of the data represented a good size to become "as familiar" as possible with it by reading, working on, and thinking about it (Mason 2006:146). I conducted an iterative process of literal, and reflexive reading (Mason 2006), focusing first on what the data said and then to be mindful of where my interpretation came explicitly through. This first stage allowed me to get to know the data, be able to recollect in my head, knowing it to the point where I anticipated what the next page said as I turned it.

The second stage represented an interpretive reading which was more systematic. Once I was familiar with the data, as Mason argues, it is important to think about a system which can be applied consistently

across “the whole data set” (Mason 2006:147). This is where my theoretical framing of mapping as practice came in. It represented the lens through which to read the data as a dance between the mapper, the map and the world. It is important to point out again the difference between ontic and ontology. The analysis does not represent a mere understanding or indeed explanation of how bits interact in this dance.

The concept of work allowed me to dig deeper into the contingencies of mapping. It enabled an analytical reading of the data comparatively across the sites, teasing out differences and making connections. In relation to mapping as work, the map represents a “vehicle” or red thread through which knowledge is expressed and communicated (Yanow 2000:254) and thus hooks or ‘gears’ into the contextual and environmental. For example, how do mappers understand their work and how do they negotiate its meaning? How do these processes influence their constitution as a community? How do they translate that knowledge to their clients? And what effects does the success or failure of that translation have? Political effects of mapping are not intrinsic to the map as representational artefact or to mapping as a smooth linear scientific process. Always via the map, mapping as a practice renders visible spaces of contingency.

Importantly, the analysis is fundamentally influenced by my encounter with it. One of the main points of an onto-genetic understanding is represented by its openness, it allowing for contingency, counter-acting the assumed ontological security. Thus, these analytical questions are counter-situated to the mere linear and safe process of data collection, categorization, analysis and visualization. Being there, becoming with it, with the impetus of opening up the map, my interview questions, allowed me to encounter the spaces of the mapping world in different ways. What

could come into view were the everyday contingencies, the creativity, experience and skill as well as the obstacles, challenges and struggles to communicate and translate what these mean to clients. These were the themes, the "interrelated categories" (Mason 2006:147, 151), which emerged. This analysis represents an understanding rather than an abstract explanation of GIS mapping.

Writing up

Writing up is a sort of mapping process. It poses the same questions as what to write in and what to write out. In the process of writing up, I anonymized the quotes as I had promised my research participants. The anonymization occurred in two ways: As the first empirical chapter engages the encounter with a variety of stakeholders in Peace Operations as well as GIS practitioners from different agencies, I anonymized them by stating their organization, the date and place of the interview. This aids in demonstrating the broad spectrum of sources consulted in the field. Second, the UN GIS practitioners received all made-up first names and again I stated the date and place of data generation. This refers particularly to chapters five and six. A matrix matching up the names of the research participants and their anonymized matches is kept safely on my personal computer and will be destroyed after the successful defence of this project. At times I wrote myself in since it was my encounter with this world, which this thesis describes. There has been much discussion about the 'I' in academic writing. However, in interpretive research, "if knowledge is situated knowledge, produced by situated knowers, 'I' is the most normal and natural voice for the researcher to use," Yanow argues. In fact it is in line with "interpretive scientific writing," (Yanow 2009:290).

This thesis is a text. And as a text it evokes a representation. And this in turn represents a conundrum. Through writing, we inscribe,

always adding to the world within which we are situated. Writing is "a way of worldmaking" (Goodman 1978). How can I write up my encounter with the 'lived experience' of the mapping world without foreclosing other possibilities, holding it still in time, inscribing a certain reality? In short, how can text evade ontological foundationalism? Is it enough to say that it is not a holistic representation but contingent geographies, evocative aspects of this world which do not wholly capture it but give a sense of it, situated in a specific time and place? According to Schatzki, it is not necessary to account for the whole of the "potentially labyrinthine complexity" (Schatzki, 2005:477). This thesis does not seek to represent a full account of GIS mapping practice at the UN. Rather, it aims at giving an "extract" from its "fuller [always becoming] reality" (ibid.). We cannot evade the words on paper but we can let them leak off the page.

During a summer school at Gregynog, Wales in June 2012, on Post-International Politics, I was inspired by Michael Shapiro's talk on writing. He talked about writing as composition, putting pieces together, constructing a narrative that always has an affective strategy. Indeed, the full text represents another moment of interpretation, as the reader engages with the text (Schwartz-Shea and Yanow 2012).

The composition of this thesis then has two purposes: One, it seeks to demonstrate a coherent, methodologically sound piece of interpretive work. The way in which the data are presented ought to be persuasive and "trustworth[y]" (Schwartz-Shea 2006). It ought to show the connections between theoretical framing, methods and empirical presentation. This represents the basis on which to justify the second purpose: It aims to be affective by allowing the reader a way into the GIS mapping world, shining a light on the shadows and

breaking the silence. It takes him or her on a journey venturing into the contingencies and complexities of mapping from the everyday at the UN to the field. By the end of the journey he or she may never look at a map in the same way. It will always begin to leak into the people, materials and spaces, constituting a contingent life world.

Conclusion

In conclusion, this chapter outlined the emergent landscape of UN GIS mapping sites I visited during my fieldwork. Because of this emergence, the fieldwork process also represented a mapping process in itself, producing a representation of GIS mapping at the UN. In addition to telling my fieldwork story, it provided further theoretical depth to the conceptualization of mapping as practice while immediately translating that into the methodological choices I made. It discussed the interpretive ethnographic sensibility focusing on the everyday, elaborating on the elements of practice and how they hang together. The goal has been to demonstrate the commensurability between the theoretical framing and the methodological investigation.

The following three chapters present the empirical investigation of GIS mapping within UN Peace Operations. They demonstrate the constitution of GIS mapping as practice organized around materiality and knowledge. On the one hand, GIS practitioners as a community of practice are clustered around an understanding of mapping, which on the other, stands in relation to their clients who use maps. The interaction between these, the negotiation of materiality and knowledge, and the understanding which emerges from that, underwrites the role and use of GIS mapping. All three work to problematize the smooth narrative of technological determinism in which a) technology is available and works seamlessly together; and b) the political effects can be analyzed as either liberally progressive or hegemonically oppressive. The next chapter begins the detective

journey of encountering all things mapping in the Timor-Leste peace mission. It teases out the epistemological fault which underwrites GIS use in UN Peace Operations: Returning to the cartographic literature, it focuses on how the normalized cartographic imagination informs the state-building project on the one hand and so does not account for mapping as a political process on the other.

4 Hic Sunt Dracones: Mapping the Politics of Representation in Timor-Leste's State-building Mission

The on-going state-building mission in Timor-Leste[11] followed its violent struggles for independence after 400 years of colonialism. Already in the 17th century the country was divided up, the Western half initially going to the Dutch East Indies and later to Indonesia while the East went to Portugal. After the fall of the Portuguese-backed Caetano regime in 1974, a violent struggle ensued over the future of Timor. The question was whether it would remain Portuguese, become integrated into Indonesia, or gain independence. FREITLIN, the Timorese pro-independence party, declared independence in November 1975. Yet, oppositional forces invited Indonesia to intervene, which subsequently annexed Timor-Leste and so fuelled further violent resistance.

Although the UN did not recognize Indonesia's annexation, the conflict continued. In January 1999 Indonesian President Habbibie offered the Timorese an independence referendum. On May 5th 1999 Indonesia and Portugal signed an agreement, allowing the UN (UNAMET) to hold a 'popular consultation' asking Timorese whether they would prefer autonomy within Indonesia or complete independence. Violence erupted instantaneously, involving Indonesian security forces. The conflict led to the destruction of much of Timor-Leste's infrastructure. Finally, in October 1999, as international pressure increased, Indonesia accepted the intervention of the international force INTERFET led by Australia and Timor-

[11] Timor-Leste is the country's official name while East Timor is its English translation.

Leste's subsequent decision for independence (International Crisis Group 2006).[12]

In this period of instability, the UN Transitional Administration in East Timor (UNTAET) took over the majority of governance tasks, acting as the quasi sovereign until Timor-Leste's official recognition as an independent state in May 2002 (UNTAET 2013). Since UNTAET, there have been several UN mandates seeking to establish security and build peace in the country. The UN mission of support in East Timor (UNMISET) lasted until May 2005 and sought to provide post-independence assistance and manage the handover to Timorese authorities. Subsequently, the UN Office in East Timor (UNOTIL) took over, focusing particularly on maintaining security within the country by building a police force and strengthening democratic institutions (UNMISET 2013). Finally, the UN integrated mission in East Timor (UNMIT) sought to strengthen and consolidate the governance structure of the state (UNMIT 2013). Its mandate ran out in December 2012.[13]

According to Chopra, so-called

> "peace-maintenance as a doctrine envisions varying measures of intrusion depending upon the degree of state failure or total collapse (or purposeful destruction); the degree of political coherence or fragmentation; and the degree to which there was imagined to be a governmental tabula rasa," (2002:980).

Based on its experience of prolonged foreign colonial governments and the subsequent devastating conflict, Timor-Leste was considered

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[12] This brief history is adapted from an overview of the conflict's history by the International Crisis Group.

[13] The UNMIT mission was ongoing during the period of my fieldwork in 2010.

to exhibit an extended degree of all of these categories, mandating the "creation of an entirely new governance structure" (Smith 2002:74). From the initial mission onwards peacekeeping came 'cum governance' (Suhrke 2001). In other words, achieving a sustainable peace was intertwined with building a strong state. Implementing peace meant implementing governance reforms.

However, particularly the initial transitional administration of UNTAET was described as a "massive neotrusteeship" (Howard 2013), and heavily critiqued as a quasi-sovereign government, which failed to "respond to the experiences of everyday life and welfare requirements of the new state's citizens," (Richmond and Franks 2008:185). Goldstone argues that while the mission "did not achieve broad institution-building objectives thrust on it by the international community, it should have acted as the midwife to an incomplete state, though not a failed one (Goldstone 2004:95–96). Some considered it a "necessary disease" (Goldstone 2004 quoting a Timorese citizen) in order to ensure peace while others considered it a neo-colonial enterprise (Chopra 2002) which ignored the local. While the days of UNTAET are long gone and Timor-Leste has its own government, the UN, NGOs, aid and development organizations are still present in Timor-Leste and continue to be involved in projects which seek to strengthen the state.

The heritage of UNTAET, as either necessary evil or oppressive, still overshadows the involvement of the international community in the affairs of the Timorese state. The intricate role the map played in establishing state space historically, as outlined in chapter 2, is rearticulated in the Timorese state-building project. Indeed, the assessment of international involvement mirrors the representational analysis of the map as scientifically progressive tool on the one hand or working to the benefit of the powerful few on the other. Bringing

back in the critical cartographic and GIS literature, the question arises, what role does GIS mapping play in Timor's state-building? Does it enable a progressive politics? Abram argues that "the epistemological category, 'science', has often been set in opposition to forms of 'indigenous' knowledge" (2005:4). As such, does the imposition of a Westernized tool in a post-colonial context represent just another form of violence?

These questions, while important, focus on the political effects of mapping. A practice perspective, takes an earlier point of departure by focusing on the production of politics. I argue that politics is made. In its production, contingent processes are at play in which how the map and the world are understood resides at the center. *Hic sunt dracones* - here be dragons – is a phrase used by cartographers to circumscribe unmapped spaces. In medieval imagination unknown spaces were inhabited by mythical creatures, such as dragons, elephants, or serpents. Their presence alluded to spaces that escape or evade the rational scientific grasping of mapping; a space which lies beyond our own understanding, a true *terra incognita*. Although this phrase actually only appears on one medieval map, the Lenox Globe (ca. 1503-07) on the eastern coast of Asia, it is still used colloquially by cartographers to designate unmapped spaces. Does Timor lie beyond the graspable spaces where the dragons live?[14] This is a question which cannot be answered by looking at circulating maps. Indeed, the role of the map in the state-building project of Timor-Leste cannot solely be accounted for by analyzing maps, pinpointing the 'dragons,' and providing a representational analysis.

[14] Interestingly, Timor-Leste's mountainous landscape is considered to be shaped like a crocodile paying homage to its mythical grandfather of the island nation.

The 'dragons' themselves, i.e. how Timorese spaces and people are represented is a product of a myriad of conceptions of and encounters with space.

The task of understanding mapping in Timor-Leste therefore must necessarily take a post-representational form. Rather than adopting an *a priori* politics of the map as scientifically progressive or neo-colonial instrument as analytical framework, replicating the discussion on the performance of the Peace Operation, the goal was to encounter mapping as a practice. During my fieldwork, I adopted an investigative detective strategy in order to find out "how things are done around here" (Mattern 2011:70). Echoing Dodge et al's concepts of transduction and technicity, I investigated the "performance, pattern, (in)competence, background, and the discursive/material nexus" (Adler and Pouliot 2011b:4) of mapping. At the basis of this investigation lies the question of how mapping is understood in relation to Timorese space and the state to be built. It moves beneath the fabric of the map in order to highlight its threads and the process of their interweaving. This is not a linear production process but a contingent practice in which how space is understood requires negotiation with the encounter of space.

The chapter is organized in three parts, each drilling deeper into the intricate dance between conceptual understanding of space, the map and the world on the one hand and its socio-material implementation on the other. The first part examines specifically how the cartographic imagination becomes rearticulated in the spatial state design envisioned for Timor-Leste. Using the example of decentralization reforms to enhance governance, it shows that while on a conceptual level the cartographic imagination and state design are congruent, this relationship becomes problematized in the implementation process. Space at times quite literally resists

capturing and flattening. The social is not easily locatable on a cartographic grid. This disjuncture between concept and encounter is manifested in the second part which examines two mapping projects. Teasing out the socio-material logistical processes brings to light the contingencies in producing representation: Mapping is not a straight forward process but breaks down, is incompetent, and at times even impossible. Both parts challenge the narrative of the role of the map as a tool easily deployable in the service of a political statist agenda. Rather, mapping is a difficult contingent process.

Moreover, as the third part demonstrates by introducing and giving voice to cartographers and GIS specialists in the field, this disjuncture is not understood by everyone in the same way. The normalized cartographic image remains dominant for non-mappers. For a lot of political stakeholders the world resides in the map while mappers understand that mapping is a political process in which space is representationally produced, by virtue distorts and at times breaks down. This acknowledgement begins to differentiate the professional communities which make up Peace Operations, highlighting their different understandings. As a consequence, those who understand the political process can anticipate and understand resistance while others cannot. Political effects of maps, such as progressiveness or oppression, therefore do not merely intrinsically reside in the map but are bound up in those who can discern what the map is and those who do not. Overall, the three parts work together to showcase that mapping as a socio-material practice in Timor-Leste rests on this epistemological fault. It articulates that mapping as an instance of logistics, rather than smoothly operationalizing politics, rests at the centre of what constitutes politics. Logistics is a site of struggle.

Practicing Representational State/Space in Timor-Leste

State-building has a very strong spatial connotation. There is "no institution without space" (Lefebvre 2003:84 quoting Louran). In other words, as state-building projects are ongoing, spaces are being envisioned and built. In this section I investigate the spatial component of state-building and its relation to mapping. During my stay in Dili, the government was concerned with implementing incisive structural governance reforms through decentralization. Decentralization according to the World Bank "implies that the selection of representatives from local electoral jurisdictions allows citizens to know better their political representatives and allows elected officials to know better the needs and desires of their constituents" (World Bank 2013).

Holding the promise for a more authentic democracy, there had been a wave of decentralization from the 1980s to the mid-2000s, almost "amounting to a structural revolution" in a large number of countries (Grindle 2007:4, 5). It ought to redefine the relationship between the state and its citizens, bringing services closer to those receiving them (Ibid). This makes decentralization the *en vogue* reform model to build 'a strong democratic state' in order to stem the re-occurrence of violence and situates it squarely within the Liberal Peace framework.

Decentralization as we shall see has of course a spatial design implicit in which local administrative units, i.e. spatial units, are endowed with a particular system of representation and associated powers in order to make decisions most appropriate for the people living within that unit. From the literature, we now know that there are two aspects to mapping in relation to the state: One, conceptually the map as representation is rooted in the modernist spatial ontology which has influenced the way in which the state, and the world as

constituted of states, is imagined. Two, mapping is the logistical extension of governance and may thus be implicated in the implementation of governance projects. Using the decentralization project in Timor-Leste as an instance of spatial state design, this section demonstrates that while the cartographic imagination is observable in the ways in which the spatial design of the state is envisioned, the logistics of implementing this imagination faces resistance. Rather than representing a mere strategic tool of the state or a neo-colonial instrument to write out local realities, the investigation of GIS mapping as practice, conceptually and logistically, highlights this clash between 'imagination' and 'the real.' Logisitcal implementation too is a site of politics, i.e. struggle.

Imagining decentralized state/space

To the first aspect: It is widely acknowledged in the cartographic literature that the map as representation is fundamentally implicated in the way in which we imagine the world from a Western perspective. There is a strong link between "geographical imagination and cartographic image" (Pickles 2004:9). The coloured blobs bordered by lines representing the states on a map occupy mental space. Thinking about the world is bound up in the circulation of its representation. Via the map, one's eyes can be cast across space, one's finger can take a journey, whether it is across the globe, from continent to continent, crossing the vast oceans, or across the space of a village tracing streets and hovering over forests.

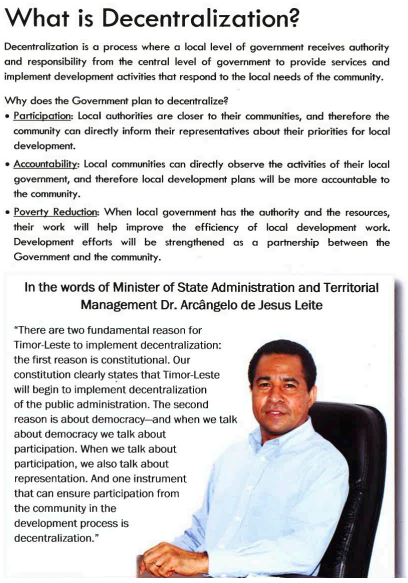
The map is bound up in the modernist epistemology of the gaze in which the world is rendered "as-picture" (Heidegger 1977) or "as-exhibition," (Gregory 1994). It enables thinking of the world as whole, as knowable, as 'standing reserve' (Heidegger 1977), as resource for appropriation in which no corner is left 'unseen.' The "conquering gaze from nowhere" as Haraway calls it (1992:188) – "enables action

from a distance" (Pickles 2004:21). Imagining the world is not thought of as a process of simplification, abstraction or even political world-making but as "plain vision [….a] source of clear unmediated knowledge" (Pickles 2004:6 following Krygier). As Conley argues "it is not only that maps have shaped identities and spaces. But also that the cartographic imagination has influenced the very structure and content of language and thought itself" (1996). And this "cartographic imagination" (Smith 2008) via "Apollo's Eye" (Cosgrove 2003) directly relates to the first aspect of the "cartographic impulse" (2004:118) for governance. In other words, the way in which space, or more precisely state space is imagined, influences the way in which it is thought out and *built*. Therefore, an expectation is produced that the spatial design of the state is implementable and the map is assumed to represent an operational aid in this process.

The architecture of a state is enmeshed in its spatial make-up rooted in the spatial ontology of the cartographic imagination. Holding space still, dividing it, and allocating the social via its geographical location come through in Timor-Leste's governmental decentralization project, its associated development plans, land reforms and the census. Importantly, this is not to say that decentralization is the universal spatial template for building a state. With a particular history it is only one model for the spatial design of a state. Branch for example elaborates on the implication of mapping in the coming-into-being of France as a territorial centralized state. He outlines the shift: "fifteenth- century France was constituted by a decentralized mix of personal relations of rule and a place-focused form of territoriality, while nineteenth-century France was linearly bounded, homogenously territorial, and centralized," (Branch 2011:22). Thus, here the modern territorial state was based on the model of

centralization while the state of Timor-Leste is being built based on the model of decentralization.[15] Despite different models, they both share the modernist spatial ontology, allowing space to be carved up and in which events and people can be located. The cartographic ontology allows for a particular kind of socio-spatial ordering.

Fig. 3 Timor-Leste Government Flyer 'What is Decentralisation?'



What is Decentralization?

Decentralization is a process where a local level of government receives authority and responsibility from the central level of government to provide services and implement development activities that respond to the local needs of the community.

Why does the Government plan to decentralize?

- Participation: Local authorities are closer to their communities, and therefore the community can directly inform their representatives about their priorities for local development.
- Accountability: Local communities can directly observe the activities of their local government, and therefore local development plans will be more accountable to the community.
- Poverty Reduction: When local government has the authority and the resources, their work will help improve the efficiency of local development work. Development efforts will be strengthened as a partnership between the Government and the community.

In the words of Minister of State Administration and Territorial Management Dr. Arcângelo de Jesus Leite

"There are two fundamental reason for Timor-Leste to implement decentralization: the first reason is constitutional. Our constitution clearly states that Timor-Leste will begin to implement decentralization of the public administration. The second reason is about democracy--and when we talk about democracy we talk about participation. When we talk about participation, we also talk about representation. And one instrument that can ensure participation from the community in the development process is decentralization."

Source: Governmental Decentralization Brochure, "Raising Our Hands for Development, Local Development Program," Ministry of State Administration and Territorial Management. It does not have a publishing date. I received this brochure during an interview with an aid official.

Timor-Leste's Minister of State Administration and Territorial Management – the title itself illuminates the close connection between space and governance – makes the argument for decentralization:

> "There are two fundamental reasons for Timor-Leste to implement decentralization: the first is constitutional. Our constitution clearly states that Timor-Leste will

[15] This concept of decentralization differs from Branch's reference to decentralization. The former, as it relates to Timor-Leste's reform is not separate from but part and parcel of a bounded homogenous space in which power is devolved but where a central or federal government nonetheless exists.

> begin to implement decentralization of the public administration. The second reason is about democracy – when we talk about democracy we talk about participation, we also talk about representation. And one instrument that can ensure participation from the community in the development process is decentralization" (Minister of State Administration and Territorial Management, "Raising Our Hands for Development", p. 2)

This renders the project of decentralization to fit squarely within the peace- and state-building agenda in which democracy is understood as the primary pre-requisite for peace and a strong state. The statement demonstrates the entwinement between the modern spatial ontology, the state and peace as a progressive recipe for development. The project is situated within a whole architecture of policies, laws, frameworks, working groups and road maps. These demonstrate the process of 'thought out' space, of the ongoing envisioning of spatial governance.

In the following section, I outline a summary of this architecture representing the plan for Timor-Leste's decentralization. It stems from a document prepared by UNDP in which Kuehn outlines the current state of the decentralization process (2010): Since 2003 planning for decentralization has been underway by the Timor-Leste government, the Ministry of Administrative and Territorial Management, and supported by the joint UNCDF-UNDP Local Governance Support Program (LGSP). In 2006 the Decentralization Policy and Decentralization Strategic Framework I was approved, laying the ground work for the consultation process, preparing the Local Government Laws and deciding that municipalities ought to be the decentralized unit of choice. Following the public consultation process, a ministerial technical working group was established to discuss the extent of powers to be devolved to local authorities. The

Decentralization Policy Guidelines decided that districts are to represent the building blocks for municipalities.

In 2008 the Decentralization Strategic Framework II outlined the key steps to the establishment of municipalities. And between 2008 and 2009 three Local Government Laws were submitted for approval by the National Parliament: the Law on Administrative and Territorial Division (approved in 2009), the Local Government Law, and the Municipal Elections Law. They sought to "define the boundaries of future municipalities with the current district boundaries [and] define the role and institutional structure of future municipalities and rules for municipal elections" (Kuehn 2010). This was followed by the drafting of subsidiary decentralization legislation focusing on sector strategies for health, water and sanitation, institutional structures, outlining government with local government engagement, municipal planning, finance and procurement etc. The Decentralization Capacity Development Strategy in 2009/2010 sought to assess the capacity of stakeholders at all levels and to come up with a systematic strategy to empower these. This list demonstrates the entire architecture of the planned design of the decentralized state, all in the name of "a strong, legitimate and stable state throughout the territory of Timor-Leste" (Territorial Administrative Division Law 2009).

The Law of Territorial Administrative Division, signed into law on June 10th 2009, explicitly outlines the *representation* of space as fundamentally influencing the building of the state: With this law, previous "district and sub-district administrations headquartered in the area of the respective municipalities are hereby abolished" (Territorial Administrative Division Law 2009). These administrations are "merged" to form new municipalities. All previous "property, the rights, the obligations as well as the personnel of the administrations

are automatically transferred" (Ibid.). Thus, as if 'standing as reserve' in Heidegger's terms (1977), space is available for modification: New municipalities maybe established through further merging or splitting as long as they adhere to the criteria set out: ethno-linguistic homogeneity, and respective local cultural identity; balance between development potential and resources; administrative center capable of accommodating the Municipal Assembly and services; minimum of population to obtain a certain level of administrative efficiency and provision of services (Ibid.). These are quantifiable attributes which can be held down and located in space around which new boundaries are drawn. The human world, social and spatial is rendered geometric (Pickles 1985:30). Massey calls this "the moment of its conquering triumph [in which] 'space' is reduced to stasis" (Massey 2005:38). The cartographic imagination rests on the modernist spatial ontology and here underwrites the design of the state.

The law refers to the "will of the majority of the populations covered and expressed through popular consultation" and the "preservation of local cultural identity" (Territorial Administrative Division Law 2009). Yet, as a text, it hides the complexity of the lived space. It prioritizes the model, the imagined, and the space of representation over the experienced social-spatial relations. And as a space of representation, it is an abstract model removed from the space and people on which it is to be super-imposed. Here we can see that the planning or 'thinking out' of state space indeed "occupies a mental space" (Lefebvre 2003:84). Although, it is important to acknowledge at this point that representational space is not unreal or separate from the world. It has effects, it frames the ways in which states and here state-building, is envisioned. Looking at its practice however, that is the *extension* of representational space into Timor's spaces, demonstrates how what seems a coherent planned architecture is being contested. The possibility of drawing lines on space as if it were

available, without history, without life, is a problematic assumption. During my stay in Dili, in November 2010, the decentralization process was still facing a variety of obstacles.

The logistics of delineating administrative boundaries

Thus, the second aspect of mapping as implicated in the logistics of implementing this spatial design model gives insight into the other side of the epistemological fault: mapping as a contingent process with potential political effects. As Crampton argues, "one useful way to understand maps and politics is as technologies of government" (Crampton 2010:78). Holding space still, drawing lines around it, and within it to carve it up, maps display the allocation of events, people, and things in places. As part of a wider state administrative system, the superimposing of the grid, street names, house numbers, postal codes, land and property licenses, village names, administrative boundaries, voting districts and tax codes are ways in which to fix, define and manage socio-spatial relations. Socio-spatial knowledge production, that is being able to answer who and where questions about a population, requires a calculable and legible territory (Scott 1999; Elden 2007; Hannah 2009). Legibility, Scott argues, is the central problem of statecraft. Indeed, it is legibility via simplification which equals administration and maps and state power which remake reality depicted (Scott 1999:4).

Categorization, measurement and calculation are therefore at the root of effective governance: on the one hand, to extract revenue most efficiently, and on the other, to provide services most appropriately. This is the process of statification or étatisation (Foucault, Senellart, and Collège de France 2008:77) in which 'space is thought out,' (Foucault 1984:244). In terms of decentralization, knowing what space constitutes an administrative unit has a myriad of effects from fiscal allocation – what powers to evolve and to whom – to electoral

zones. This is part and parcel of statification. The "triad of political cartography [engulfing] government, statistics and population" (Crampton 2010:71) shows how governance works through categorization, bordering, calculation and measurement to enable the management of space and subjects. This is the assumed logistics of the state.[16]

However, space is not simply available to be divided up in the most appropriate form government chooses. This spatial design model of the state based on municipalities circumscribed by administrative boundaries seems to hover above the ground, not implicated in its complex realities. The delineation of administrative boundaries and the "topographic description of the borders" of municipalities are incumbent upon the Ministry of State Administration and Territorial Management (MSATM) to define (Territorial Administrative Division Law 2009). However, this administrative boundary project has led to the exasperation of its proponents. In an interview with the Minister of MSATM, he stated that what he does is state administration but the territorial management part simply happens to be on his portfolio. He stated that he was not quite sure of how to go about this part of his remit and how to enforce it (Minister MSATM, 1st December 2010, Dili). The territorial management refers to the implementation and maintenance of the spatial state design.

He mentions several examples of hurdles he has encountered in trying to implement administrative boundaries: the district of Ainaro, asked to be "put [...] together with these sub-districts but [those] do

[16] The depoliticized, territorial, and technocratic model of state-building is problematic is of course widely acknowledged in the critical state-building literature. For further examples see Bliesemann de Guevera and Kuehn 2010.

not want to be included in Ainaro," (Minister MSATM, 1st December 2010, Dili). People are resistant to have boundaries superimposed or to be told *where* they belong. Carving up space into spatial units to which social groups can be allocated is not a straightforward process. He also states that they need to decide where capitals should go in the new municipalities and what to name them. This represents another difficult process. "It is a big issue and it is difficult to tackle," he says (Minister MSATM, 1st December 2010, Dili). Spatial design for governance is not a smooth process but faces resistance from the people. While this resistance is acknowledged as a problem, it is not understood in terms of, or in relation to, the conceptual cartographic imagination. Therefore, while the logistics of the state are recognized as part of the political project of state-building, logistics is not problematized but assumed to be inherently efficient.

Making the decision that the decentralized units should be municipalities, and drawing boxes onto space as if available, seems separate from local understandings of land, property and community. Land is indeed a multi-layered problem, as a representative of a civil society land advocacy network, states (Rede Ba Rai staff member, 1st December 2010, Dili). She states, that two eras of colonialism, first Portuguese than Indonesian, have produced different records for land titles if indeed there are any. The emphasis here is on production as these land systems are not natural. Moreover, because of the conflict a lot of houses have been burned down and people have been displaced. She further states that this meant that people have been living in houses for more than ten years that were available at the time while others are now returning and claim ownership (Rede Ba Rai staff member, 1st December 2010, Dili). The notion of one box, i.e. the state, in turn being made up of little boxes, i.e. municipalities, is congruent with a modernist spatial ontology which equates space with representation. According to Massey, spatialization means

representation; it means to "tame spatial into textual and conceptual into representation" (Massey 2005:20). The decentralization architecture set out in the UNDP report is just such a taming, an assumption that the world out there can be brought into 'plain view' and succumb to the conquering grasp of the grid.

However, Soja states, referring to Lefebvre, Poulantzas, Giddens and Gregory, all making the same argument, that while this "spatial fragmentation or coherence, and homogeneity [is] often integral to the instrumentality of political power, [it is a] social product" (Soja 1989:126). It is not naturally given but "requires continuous reproduction [often representing a] source of conflict and crisis" (Soja 1989:129). This acknowledgement of spatialization as potentially contested production stands in contrast to the normalized imagination in which space is simply available.

That this conflictual process is acknowledged by some is evident in the USAID backed the Strengthening Property Rights Program, called Ita Nia Rai ("Our Land"). They collect data, via GPS to sort out land claims, recording every parcel of land via GPS to feed into GIS and display where multiple claims exist. It was indeed acknowledged by USAID in 2006, according to an Ita Nia Rai representative, that land is a conflict instigator (23rd November 2010, Dili). Displacement and clashing claims to land intervene in the process of carving up space into administrative units.

In fact, one can see the conceptual enmeshment between lived experienced space and the conceptual space of representation, the latter being the "homogenous, logistical, optico-geometrical, quantitative space" of the state (Lefebvre 2003:90). As mentioned in chapter 2, the relegation of dynamism and richness of life to time leaves space dead and static. However, when focusing on the

practice, on the implementation or rather production of this static space, its reality, dynamism, multiplicity and resistance to being boxed up emerges. I had an interesting conversation with an anthropologist with whom I shared a house for a couple of days in Dili, working on "the social contours of post- violence reconstruction in Dili [..particularly] look[ing] how engagement with [...] hous[ing] create different visions of National Timorese space-time" (articulated later on in a social media message, 1st February 2012, Edinburgh). What I gathered about Timor's spaces from this conversation was that a tension exists between the fragmentation of spaces on the one hand, and the aspiration of unifying these in the name of the state and peace on the other. As he argues, the whole discourse of

> "Unity in Diversity" (the Indonesian State Mantra) is the model on which a lot of Nation-Building is happening, but it is really failing to take account of people's experience on the ground. So right now there are projects of standardization (of language, of owned territory, of citizenship) that are attempting to produce a unity out of fracture, while at the same time purporting to preserve elements of Timorese social identity that are predicated on internal difference and fracture (that is, the possibility of coming into a relationship with another social group)" (social media message, 1st February 2012, Edinburgh).

This seems to echo the Law on Administrative Territorial Division which at once seeks to achieve homogeneity while 'preserving local culture.' The governmental move to impose a state design, to make its space and population *legible* however, is not easily brought into congruence with Timorese lived experiences.

A research report by the Globalism Research Center, from the Australian RMIT University called "Understanding Community – Security and Sustainability in Four Aldeia in Timor-Leste: Luha Oli, Nanu, Sarelari and Golgota" elaborates more on this lived spatial experience focusing on case studies of four different villages. It gives

an important insight into the interrelationship between the social and the spatial. For example, it argues that Timor's history intersects and is enmeshed in the spatial organization of the social:

> "This movement back and forth of people during and after the Indonesian occupation may help to some degree to understand a defining feature of Luha Oli [village], namely that the community is not defined by a single territorial space but rather is defined as a community linked by familial relations over a wide space that is often intersected by other territorial domains. " (Grenfeld et al. 2009, p.49)

In other words, the social has no coordinates. Communities move across and within space and are enmeshed with it. This enmeshment of spaces and people does not go unnoticed by state-builders. As an aid worker tells me, the field is dynamic but the government wants clear projects (AECID Aid worker, 3rd December 2010, Dili). Another states, "people don't organize themselves geographically but socially," (Freelance GIS consultant, 22nd November 2010, Dili). "Orientation is word of mouth," argues again another aid worker (Irish Aid, 30th November 2010, Dili). Space seems to be perceived and lived differently. When people move they often take their succo (village) with them. People move socially not geographically; they move down the street and then take their succo with them, (Freelance GIS consultant, 22nd November 2010, Dili). The report also reiterates these claims via several examples:

> "There are however Nanu houses intermingled with Haliknain houses in the northern part of the village. Hence, it is worth re-stating that the coexistence of Nanu houses in the same physical space with Haliknain cautions against equating an aldeia [sub-village] with what appears as a single and coherent cluster of houses or single bounded geographic territory. The two communities may appear to an outsider as one. According to one younger man interviewed, in a day-to-day sense both Haliknain and Nanu do seem to function as if they were one

> community: From the point of view of government, it's two aldeia, but from the community it's only one." (Grenfeld et al. 2009, p.81)

Representational state space, essential to governance clashes with Timorese socio-spatial relations. Importantly, the aim here is not to produce an anthropological account or essentialize what are complex Timorese realities. Rather, it is to highlight the clash between conceptual state space, based on cartographic imagination, and lived space which underwrites the epistemological fault. It is to point out how dynamism and difference resist the assumption of governance, rooting the social geographically in space. "What people see is that they/we are trying to re-define their communities," (Rede Ba Rai Land Network staff member, 1st December 2010, Dili). There is resistance to the "Western-based political or administrative systems [which] define land/space into clearly marked administrative units and are based on where people physically live" (Freelance GIS consultant in "Issues Concerning Geographic Information in Timor-Leste," October 2009, see footnote 50).[17] In this sense, the above statements really bring to light the problem of translating an intertwined socio-spatial complex into flat space, which is recognizable in Scott's sense of a homogenous calculable space, making the social legible in space.

The socio-material contingency of mapping Timor

Mapping, including "data collection and analysis is not done in isolation from specific government goals," argues Crampton (2010:69). Mapping projects are an extension of the "spatial logistics of the state" (Lefebvre 2003:84). The logic through which mapping works, that is the socio-spatial ordering, is part and parcel of a

[17] This brief was handed to me by its author, a freelance GIS consultant on 22nd November 2010 in Dili.

regime of governance. However, while it is possible to see how state space represents order "imposed on the inherent life of the real" (Massey 2005:30), talking to those tasked with or implicated in its implementation, further highlights the trouble with its enforcement. It also begins to outline the epistemic fault in terms of communities of understanding: some are aware of mapping as production process while others are not.

The administrative boundary project, upon which the spatial implementation of decentralization hinges, has attracted much attention. The Geographic Information Group disseminated a brief on "Issues Concerning Geographic Information in Timor-Leste" in October 2009, which dealt solely with the problem of administrative boundaries and its political implications. I also spoke with the author, a freelance GIS consultant while I was there. The document outlines why the MSATM and other agencies responsible have thus far not delineated the administrative boundaries:

> "a) There is a general lack of awareness by policy and decision-makers on the scale and implications of the problem, b) if they are aware of the problem, they do not consider it a priority, or c) they understand the problem and would like to do something about it, but the agencies they manage do not have the capacity to design and implement an administrative boundary delineation program. In most circumstances, all three reasons are applicable," (Geographic Information Group paper, 2009).

This assessment has several implications: For one, it seems to problematize the notion of a coherent political community with governmental goals, the salience of which extend beyond the envisioning of space into the implementation of spatial policies. Moreover, this means that either representational space is so normalized that its implementation being problematic seems inconceivable. Space just does not matter as much or they just do not

know what to do about it or how. The latter reason is echoed by the Minister of MSATM: Acknowledging decentralization as a model or the spatial ontology on which it relies as a conflictual process is not his explanation of the process. For him, all that is needed is the right methodology to execute delineation. In other words, the success of mapping is a mere question of better technological execution rather than a question of understanding the mapping process in relation to spatial realities.

Fig. 4 Image of Conversations about GIS

The head of the GIS Group talking to the Minister of Estatal about the possibilities of GIS. Source: Consolidating PDS Data & Developing the National PDS Database, Consultancy Report No.12, 15th August – 19th September, 2010

In the depicted conversation above, the head of the GIS Group emphatically explains the utility of GIS to the minister. GIS mapping in this instance is viewed as a possible solution to the delineation of the spatial administrative units. It represents the tool to make the division of space possible. As a consequence of these kinds of conversations the minister states that they really require assistance with GIS (Minister of MSATM, 1st December 2010, Dili). If the technology can be made to work, a competent process could ensue.

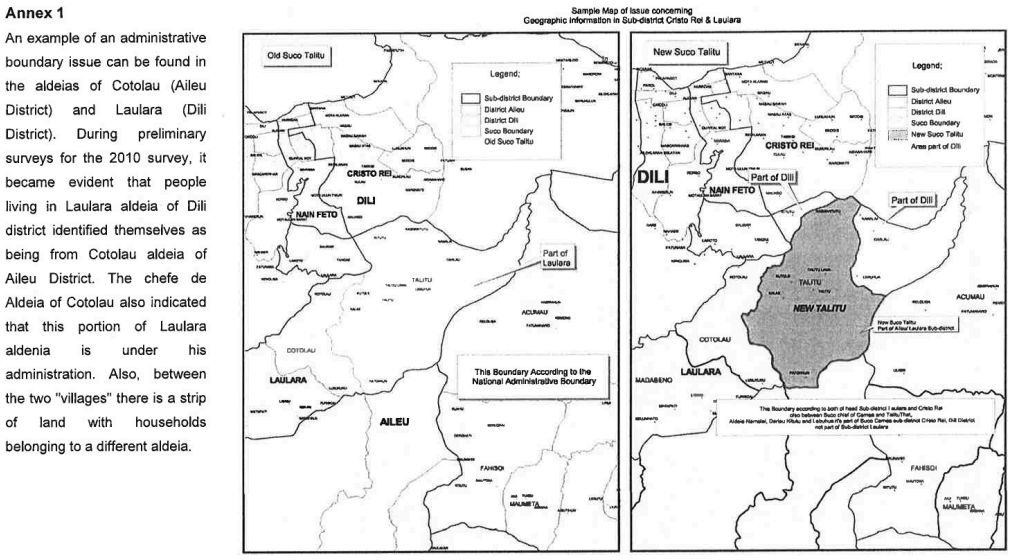
This demonstrates: first, the privileged position of the imagined envisioned state space over its logistics, and second, the position of GIS mapping not as a central tool but a misunderstood, if possibly useful, afterthought.

While the document further outlines and attests to the clash between official boundaries and "reality on the ground," it also confirms the secondary position of logistics broadly, and maps particularly, in the state-building process. There are no official government maps which assert boundaries. Most maps date either from the Indonesian or Portuguese colonial periods. And these circulating maps differ on the location of certain boundaries and different versions are being used by a variety of "government agencies, communities, donors, UN groups and NGOs" (Geographic Information Group paper, 2009). Because of this complex real, the ministry rather "provides lists of administrative areas" (Freelance GIS consultant, 22nd November 2010, Dili). Yet, "inconsistency can be found in the 2004 official list of sub-district, succo and aldeia names," (Geographic Information Group paper, 2009). A member of the National Directorate of Land, Property, and Cadastral Services (DNTPSC) also attests to this at the UN Regional Cartographic Conference in 2009, when he states that there is "no legitimated administrative boundary data [and that the] various versions lead to confusion" (DNTPSC 2009). Lists however, as mentioned previously, do not necessarily visualize clashes and incongruences as powerfully as maps do. In the interview the author states, "in my experience, in development, using maps first makes things worse before they make them better – [they] make things visible that people would rather ignore" (Freelance GIS consultant, 22nd November 2010, Dili). Moving to the meta-level of the argument we can see that logistics as a practice sits right at the centre of the constitution of politics not because it operationalizes political objectives but because it it is part and parcel of negotiating these.

This explanation of non-use or secondary concern allocated to maps renders them as contingent artefacts in which political effects are produced but are not inherent. In other words, through explaining why maps are not working, a potential for a discourse on local politics emerges.

There are numerous disagreements over boundaries as well as locations of succos, i.e. villages. “Succos are not contiguous spatial polygons,” argues the author of the paper in an interview (Freelance GIS consultant, 22nd November 2010, Dili). Polygons are a spatial data format in GIS. They define areas connected through lines, thus representing fields of any kind. Indeed, he argues that “as soon as you draw a line, indicating a yours/mine scenario you run into problems” (Freelance GIS consultant, 22nd November 2010, Dili). As elaborated on above, Timorese do not identify via physical location but rather via their social ties. The text next to the map below talks about how people identified to live in one aldeia (village) cartographically actually identify themselves with being from another, all the while a bit of land inbetween both aldeias being claimed by a third. Not only the map, but the process of mapping itself brings to light the simultaneity and overlap of a sense of belonging which clashes with the cartographic space as distinct, homogenous and divisible.

Fig. 5 Map of Administrative Boundaries in Timor-Leste



Source: "Issues Concerning Geographic Information in Timor Leste", October 2009. Document received during interview with GIS freelancer in Dili, November 2010.

The map here leaks into its situatedness, that is, the document which contextualizes it, and the interview of the GIS specialist embodying the skill, knowledge and competence of using the technology. Thus, rather than settling the boundaries and acting as an instrument of the state, oppressive or progressive, it highlights the contestation of the representational space to be imposed. Moreover, its purposiveness, in this instance delineating administrative boundaries cannot be analyzed separately from those agencies that are tasked with it. And they, according to this document, attested by the confusion I encountered in interviews with political stakeholders, either lack awareness and knowledge or lack capacity to address it. Some, as the minister of MSATM, inscribe hope into the technology to sort it all out. All the while GIS specialists point to the difficult

process of making the GIS polygon space congruent with the 'succo' space. This renders the politics of GIS use in the context of state-building contingent on a shared understanding across professions, i.e. that a polygon space is in itself a construction. It demonstrates that agency in terms of understanding the epistemological fault matters. It matters in relation to the production of political effects.

Exploring Two Mapping Projects, imagined and contingent

In this next section I drill further into two mapping projects I encountered in Timor-Leste, particularly focusing on the socio-material production process. Both further showcase the challenges and obstacles described above. They detail on the one hand the difficult IT and human resource environment as well as the struggle of holding space still and to allocate the social geographically in it. The two cases illustrate the technicity of mapping Timorese spaces as set out in chapter 2. Technicity is nothing merely technical but represents the ways in which material mediates the always becoming process of mapping. Following the previous sections it problematizes the assumption that materials and bodies always seamlessly work together to produce a competent outcome.

The difficulty of mapping the social has been extensively acknowledged in the cartographic literature. And as this difficulty, or rather contingency is mirrored in the following two examples it is worthwhile quoting Pile and Thrift's words here at length:

> "The human subject is difficult to map for numerous reasons. There is the difficulty of mapping something that does not have precise boundaries. There is the difficulty of mapping something that cannot be counted as singular but only as a mass of different and sometimes conflicting subject positions. There is the difficulty of mapping something that is always on the move, culturally and in fact. There is the difficulty of mapping something that is only partially locatable in time-space. Then, finally, there is the difficulty of

> deploying the representational metaphor of mapping with its history of subordination to an Enlightenment logic in which everything can be surveyed and pinned down," (Pile and Thrift 1995:2)

While they refer specifically to the evasiveness and intangibility of the social, the arguments made thus far – particularly following Massey – suggest that space also falls into the same category of liveliness. The social and the spatial are dynamically intertwined.

That mappers on the ground struggle with this enmeshment is exemplified by an NGO official, engaged in a simple mapping project, who suggests that in order to deal with this 'problem' of entwinement, one should start from the social point rather than from a geographic point (Local NGO Worker, Belun, 30th November 2010, Dili). However, the landscape too is constantly shifting. Space is constantly on the move, morphing into different forms. Some roads shift season to season, they are simply not fixed. So, when GPS equipped four-by-fours seek to map out a road, they cannot match it to any existing maps, and the features the map represented might be gone during the following season. It is a rather fluid and dynamic situation (Local NGO Worker, Belun, 30th November 2010, Dili). The socio-spatial realities of Timor-Leste are not easily captured, or rather, do not easily surrender to the logic of the map. Space is not easily fixed, while the social is not readily geographically locatable within it.

A smooth narrative of mapping implies that people and things, i.e. all that GIS is as a system, work together and cooperate to produce competent and effective use. Looking into its practice however illuminates its contingencies. At times spaces prove resilient. People and places resist succumbing to the grasp of the grid.

Monitoring Security Project

One of the mapping projects I encountered had the purpose of monitoring the general security status of the regions. One GIS specialist stated that particularly in the area of security the utility of GIS is obvious (Freelance GIS consultant, 22nd November 2010, Dili). The technology lends itself to surveying the lay of the land and to anticipate any changes, which could possibly constitute a threat to security and thus re-ignite violence. The surveying and data collection for this project started in 2006 in order to monitor security on the border but also of the general population as part of the UNMIT mandate. It was managed and executed by several parties: The UNMIT GIS unit managed the database and provided the visualizations, i.e. the maps. The MLG, or Military Liaison Group was constituted of UNMIT and ISF (International Stabilization Force) soldiers collected the data.

Equipped with surveys they consult village chiefs in the different districts. The questionnaire was designed by members of the military, covering ten different thematic areas to assess the state of health, infrastructure, education, political issues, food security, and so on. The data is then fed back to the Joint Mission Analytical Center (JMAC) where the data was entered into a database and then produced topic-specific maps, such as on food security or health status. The goal was to take stock periodically, to locate and assess these conflict indicators in order to prevent violence and conflict escalation. The machinery sets out to survey these communities, to tie them down geographically, make them visible for monitoring. The assemblage of materials and bodies include soldiers, as interviewers or translators, GPS hand-held devices, white UN GPS equipped four-by-fours, plotters, cameras, the questionnaires, maps, GIS professionals, computers, databases, all encountering the Timorese space with its roads, flora and fauna, villages, village chiefs, elders, village residents, and animals.

With all its moving parts it embarks into, and imprints itself on, Timor's spaces, trying to literally gain traction. Intrinsic to the possibility of this project is the assumption that a community can be found in one spatial polygon. And moreover, it is assumed that other phenomena or attributes, such as food security statuses, are geographically locatable and measurable. The project seeks to produce a snapshot per community at a time, in order to analyze from a distance, tracing the development of assumed conflict indicators so as to intervene if necessary.

The MLG go out everyday to visit different villages. They go to the district level, sub-districts, succos and aldeias. Additionally, they verify data they receive from the chiefs five times a year at the sub-district level. This verification process entails labeling data as either "accurate," "not assessed" or "not accurate." Interviews last about one to one and a half hours. The questions are semi- structured providing the interviewers with the opportunity to ask if there is anything that is unclear and to take note of that. I was told that it is indeed important to dig deeper since "they will not tell you unless you ask" (MLG Officer, 27th November 2010; see footnote 50). The notion that 'the locals,' as they are referred to by political stakeholders, do not understand 'maps' seemed often present: Locals cannot read maps, "don't even try to give them one, they don't think map style" (conversations during fieldwork). This notion clearly demonstrates that the map is assumed to represent an ordered world, i.e. the natural order, and that Timorese spaces and its people must be made to fit it. Thus, for the security-monitoring project, data collection is rather a process of facilitated extraction and imposition of order.

For the purpose of the consultation, Timor-Leste's space is separated into five arbitrary geographical areas to which five MLG teams cater. These are so-called AORs - areas of responsibility: Ocuessi, Bacao

(which means everything west of Manatuto), Covalima (Ainaro, Manufahi), Dili (Aileu, Manatuto, Dili and a bit of Liquica), Bobonaro (Ermera and the rest of Liquica), (JMAG officer, 26th November 2010, Dili). The teams consist of interviewers and interpreters. They come equipped with the questionnaires as well as the ones from the previous survey six months ago in order to compare the data. Before their visit, they get in touch with the Chefe de Succo in order to arrange for a suitable time and to allow the chief to get the information together. Often when they meet, the chief is also accompanied by youth groups, other elders, and aldeia chiefs. One of the objectives is that through the surveys it becomes apparent where food shortages exist, which is then supposed to be passed on to the government through UNMIT so that they can be addressed. In addition to villages, they at times also interview businesses or schools. They keep a register which logs who, when and where they visited. These visits are documented with photos and lists to ensure they keep track of where they have been and at what time. About 2500 reports are produced every year making about 60 reports every week.

The assumptions underpinning mapping, i.e. that it works as a tool of governance are evident. The logic of the project illustrates an attempt of socio-spatial ordering, where spaces are carved up, the social is allocated within it and consulted in order to extract information. Monitoring people and conflict indicators works to provide a basis for effective governance. The machinery and all its moving parts having to work together are also obvious in order to make this extraction process happen. Yet, if we dig deeper into the logistics of this project, the smooth narrative in which mapping is an available to tool for monitoring security begins to crack. Rather, what we find is, how mapping is materially and socially mediated,

represents an 'incompetent' performance and disorganization. The socio-material machinery fails to gain traction.

For example, I was told that some succos have never been accessed. They seem inaccessible in a quite literal sense. The assemblage cannot reach them, their four-by-fours cannot get there, their maps cannot find the path and the GPS cannot map them out. They seem to be beyond reach. Technicity is about the extent to which, and the quality of how, materiality mediates mapping. Here, the materialities cannot grasp and gain traction on the Timorese spaces according to the cartographic logic. At a beach BBQ I randomly met one of the MLG officers,[18] who is a member of one of the teams doing the surveying. When I ask him about the process he just shakes his head and states that in his opinion the produced maps are highly inaccurate because of the changing succo names (27th November 2010). It is difficult to decide on a 'where' to which one can attribute the collected data. Especially, if you cannot find the 'where.'

As the social is tied down in space by being surveyed in a specific location, its tagging, i.e. naming the location, cannot be fixed. It may move and fluctuate, ultimately problematizing the set goal of monitoring and securing. The officer also mentioned the problem of the changing roads. The roads mapped by their cars do not correspond to any other map. Attempting to match up realities and representations discloses the clash between cartographic space and lived space. Socio-spatial relations are dynamic and seem to slip the assemblage's grasp. Accessibility, naming and tagging villages represent real obstacles. Technicity in this context is about the

[18] This was on a weekend trip outside of Dili as I was heading towards Los Palos. On a walk at a beach I met some people who were having a BBQ and one of them turned out to be an MLG officer (27th November 2010).

quality of material mediation as well as the expectations underpinning this mediation. The governance logic of mapping clearly anticipates the imposition of order through mapping to be possible. However, the problems the socio-material mapping machinery faces in its implementation process does not necessarily lead to a questioning of this assumption.

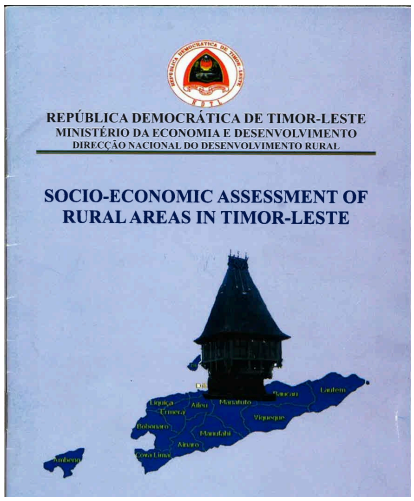
Data collection processes and resultant data are being labeled 'inaccurate.' When I mentioned this mapping project (MLG/JMAG project from UNMIT) to a consultant to the Ministry of Economy and Development, she shook her head as well and stated that the data was completely unusable. She argues that one, they do not have a rigorous strategy for data collection, and two, they only consult the village chiefs, (MED Consultant, 2nd December 2010, Dili). The MLG/JMAG data does not seem to have any credibility. So how is mapping then understood? The 'inaccuracy' is understood by some to be the product of incompetent performance where mappers were simply not vigilant enough. From this point of view, logistical tools such as mapping require expert use according to a proper methodology. Their breakdown is due to incompetence. In contrast, others, often those directly involved in the data collection and map production, understand the 'inaccuracy' to be an intrinsic element to mapping which by virtue imposes an abstract order on a complex real. This division in understanding represents the epistemological fault with regard to the politics of representation.

Socio-Economic Assessment of Rural Areas Project

Another example I encountered during my fieldwork exhibits similar characteristics. It was a project by the Ministry of Economy and Development (MED), called a "Socio-Economic Assessment of Rural Areas in Timor-Leste" (Project Brochure, July 2010). It ought to represent the first step in a series of consultations in order to

"identify economic activities with potential for more growth that could, if adequately supported, substantially improve living conditions in rural areas" (Project Brochure, July 2010, p. 2). By providing an overview of existing micro-business, the Ministry hoped to "improve [its] strategic planning" (Project Brochure, July 2010, p. 2). In comparison to the security mapping which sought to identify in order to monitor, this mapping project sought to identify in order to build. The identified businesses ought to create the starting point for development, as part of the effort of building a sustainable economy undergirding a strong state. Either instance however, requires the location of people in space.

Fig. 6 Brochure of Socio-Economic Assessment of Rural Areas in Timor-Leste Project

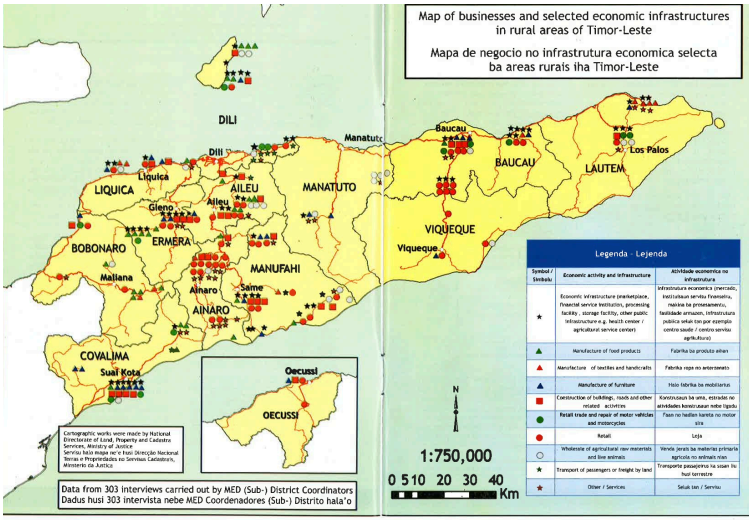


Source: Project Brochure, July 2010. It was handed to me in an interview by a consultant to the Ministry.

Here too, a broad assemblage was necessary to create and deploy this machinery of consultation: The European Commission provided the funding to conduct training on interviewing skills for the Ministry's staff and the project was supported by the National Directorate of Land, Property, and Cadastral Services (DNTSPC) situated within the Ministry of Justice. As the brochure states, DNTPSC provided

"guiding maps" while the National Directorate of Statistics under the Ministry of Finance provided the GPS receivers. The International Stabilization Force provided "valuable resources" for GPS training and map design. Again, we can see the machinery, ready to encounter and imprint itself onto Timorese spaces. Overall, 1264 businesses were assumed to exist based on held registrations. As a staff member stated, the methodology was to "go and find them" (MED Consultant, 2nd December 2010, Dili). About 60 MED staff carried out about 300 interviews in "all districts with the exception of 4 sub-districts in Dili" (Project Brochure, July 2010, p. 3) Three-hundred was assumed to be a good sample size considering the number of known business owners.

Fig. 7 Map of Businesses and selected Infrastructures in Timor-Leste's rural areas



Map as a product of the project; depicted inside the Project Brochure, July 2010.

Yet, the process of data collection as well as the data output was not without its problems. Already, the notion of having to go out and find some of them in a space where locations are either difficult to ascertain or to access, exhibited some obstacles. As the consultation process was conducted, visits to business owners were not matched with existing lists, which led to some confusion in determining who in

fact had already been consulted. Moreover, the actual sample turned out to be geographically skewed. As the map shows, most businesses displayed seem to exist in the Western part of Timor-Leste. This does not completely reflect 'reality.' The booklet in which the map is printed states:

> "The presented data on the map do not represent the total of businesses and economic infrastructures in Timor-Leste as information was based on 303 interviews. Furthermore, not all of the collected questionnaires contained sufficient GPS data to establish waypoints. Therefore, the number of businesses shown on the map is not identical to the data used in the analysis," (Project Brochure, July 2010, p. 4)

This is the given explanation in the brochure in order to account for the problematic visualization. Insufficient data, discrepancies between what is represented and actual data demonstrate the incompleteness of the end product. Not all areas were consulted, just as was the case in the previous project. Issues relating to transport and access are reported as inhibiting completion (MED Consultant, 2nd December 2010, Dili). Again, the data is assessed as not really accurate. The goal of the project was to create a foundation for evidence-based policy (Ibid.). The minister needs specific data, not just data collected or held by other ministries (MED Consultant, 2nd December 2010, Dili). The consultant who had worked on the program framed the problems as temporal (Ibid.). She stated that the project would continue in the following year where they hoped to complete some of the data collection. The goal is that on a basis of salient data "district planning and problem-oriented solutions" will be enabled (Ibid.). Again we can see the continued belief in the governance logic underpinned by an expectation of competence. The possibility of GIS mapping is conceptually maintained, even though the data collection process and the map outputs are consistently

assessed as inadequate, inaccurate, or in some instances as 'just plainly wrong.'

Investigating mapping as a practice demonstrates that both projects exhibit not only socio-material contingency but also that this contingency is explained and understood differently by different groups. Technicity, the ways in which materials mediate human interactions, "the unfolding or evolutive power of technologies to make things happen *in conjunction* with people" (Dodge et al. 2011b:113) is not a linear process. Transduction too, the ways in which mappers apply their skills to produce maps, is not just a question of professional competence. What lies at the heart of mapping is how it is understood.

Consider the following: Stein for example teases out how

> "the humanitarian community relies on background knowledge that has developed over time, a form of 'inarticulate know-how' or 'tacit, taken-for-granted knowledge', which anchors reasoning, expectations, and judgement among practitioners delivering tents, providing emergency medical aid, and supplying clean water [...] It is the way we do things" (Stein 2011:89).

While Stein aims to highlight a modus operandi that is intrinsic to the humanitarian community exemplifying their logic and understanding, these mapping projects underscore the relational quality of practice. Neither mapping nor humanitarian practices occur in isolation. Communities of practice are never just homogenous, competent executioners. They exist in relation to one another. Mapping extends from its governance logic to its logistical implementation. However, as these examples have shown, how mapping is understood and what meaning it is given, particularly what kind of political status it holds differs largely between mappers and political stakeholders. Thus, the politics of logistics is not merely resident in its ability to re-constitute spaces in this case in map form

but in the negotiations of meaning and possibility underlying it. Observing these mapping projects and speaking to mappers demonstrates that Peace Operations are not homogenous but are constituted by multiple understandings. Some mappers working directly for the Peace Operation elite for the explicit goals of economic development and security exhibit a sensitivity to the local realities. Even if they are not successful in making these realities the dominant understanding, they exist. The unsuccessful mapping projects highlight the contingent spaces within the Peace Operation narrative.

Zooming into the interactions, spaces of contingency emerge. In this case for example, acknowledging the contingent production process and resistance of the real, re-frames the politics of mapping. The politics of mapping is not intrinsic to the artefact. Indeed, even if mapping ultimately succeeds in imposing its grid, by rooting the social in space, not acknowledging the everyday struggles seems to do injustice to a) mappers who recognize the resistance and understand the imposition to be potentially problematic and b) to those being mapped, silencing their resistant agency in the process.

Encountering Maps: Presence, Absence, and Chaos

This incongruence in understanding exhibited by the epistemic fault influences the organization of mapping in the field. Rather than a coordinated practice in which a routine is discernable according to particular mapping rules or norms, the mapping project could be characterized as disorganized. In this section I draw a picture of my encounter with mapping in the field, giving voice to the cartographers and GIS specialists in the field. They complain about maps not even being used enough, or if so, often misunderstood. Data is not being shared. There is a lack of infrastructure and overall skilled people. What constitutes logistics, the socio-material processes, are not considered efficient but are at stake in discussion.

The GIS Day Event was one of the main reasons I came to Timor-Leste in November. From the flyer I had read online, it suggested that this week and a half long event (November 16th to the 29th 2010) would showcase the role GIS played in the country's development towards peace and security. Organized by the Geographic Information Group Timor-Leste (GIG TL), the event was supported by a variety of key stakeholders: UNMIT GIS Unit, UNDP, the EU, UNICEF, UNFPA, the Japanese development agency JICA, USAID, the WFP, as well as ESRI,[19] erdas, and Global Spatial Data Infrastructure Group. It sounded so promising: GIS was around, used and purposively so. The event was set up in the foyer of the Casa Europa, the EU's headquarters. Interestingly, the flyer describes the venue as "beside Palacio Do Governo" providing a landmark orientation rather than a street address. The event consisted of an exhibition of different thematic and topographic maps and a huge map of Timor-Leste on the floor. By the entrance, general reference maps of Timor-Leste as well as agency leaflets were available. The set-up promised a competent demonstration of GIS use by and for the stakeholders.

However, the turnout to the event was surprisingly low. Almost daily presentations promised insight into how different ministries, such as Justice, Finance, Agriculture and Fisheries used GIS. But hardly anybody showed up. I went to as many presentations as I could but the highest turnout I observed was about 20 people. Presenters were disappointed but not unsurprised by the low level of interest particularly by political agencies involved in state-building and development of Timor-Leste. Mappers are used to not being considered a high priority in the political undertaking but rather a

[19] ESRI is the biggest supplier of GIS software ArcGIS, offering management applications, training and support.

technological specificity to be occasionally drawn. They feel as not seen as essential in themselves. The impression I got was that GIS mapping did not seem to have hit the ground or as yet not ushered in a promising technological revolution.

A lot of presentations talked about the 'potential' of GIS and the plans people hoped to implement. They certainly did not demonstrate a policy-integrated technology. As I talked to presenters, probing why projects had not been implemented or the potential of GIS was so under-used, they began to paint a picture of the environment in which they worked. In addition to being considered a low priority by their political clientele, the infrastructure, hard- and software as well as human resources are problematic. As an NGO worker states, GIS is highly desirable but there is a need for good equipment. Technology in this environment requires a lot of care and maintenance. However, a lot of computers and plotters are lying around "dead in a plotter graveyard" and technology "has a drag on sustainability," (NGO Ita nia rai representative, 23rd November 2010, Dili). If a plotter breaks down it can take months for a new order to arrive (Staff member DNTPSC, 24th November 2010, Dili). GIS software licences are expensive and thus require upfront investment. At an agency conducting a land titling project, Internet access has been disabled, simply because too many computers have been infected with viruses (NGO Ita nia rai representative, 23rd November 2010, Dili).

There is a lack of skilled and trained personnel to operate basic IT infrastructure in order to conduct GIS analysis. A staff member of the National Directorate of Statistics states in an interview that during the 2010 census, trained data collectors took GPS coordinates for all the dwellings in a village from the same point, the chief's house. This produced unusable data because it did not give the data points for all

the houses (24th November 2010). A member of the National Directorate of Land and Property and Cadastral Services (DNTPSC), situated within the Ministry of Justice, attests to this "severe lack of human and institutional capacity [particularly] to develop, store, revise and distribute GIS data" at the 18th UN Regional Cartographic Conference in Bangkok in 2009 (DNTPSC). He also states that "training (external and internal) [is] still required" (DNTPSC 2009). Some feel that in the beginning the new technology was a bit oversold, especially since there was no support, (NGO Ita nia rai representative, 23rd November 2010, Dili). While some agencies have good equipment, such as ALGIS, Agricultural Land Use and GIS, smaller organizations struggle. The material artefacts which mediate practices (Reckwitz 2002; Latour 2005) from plotters to computers do not always act together to enable the performance of mapping. Moreover, as a relational practice, the lack of skilled people engaging with the existent material also hinders the competent performance.

Data collection and use is often unsupported, too expensive, not deemed necessary or uncoordinated. As a development worker states, collecting good data is time consuming and costs a lot of money. Often these resources are unavailable and so they have to rely on secondary data (AECID aid worker, 3rd December 2010, Dili). On the other hand, there seems to be a lot of duplication, (NGO Ita nia rai representative, 23rd November 2010, Dili). A Freelance GIS consultant, who has worked for a variety of aid and development agencies, tells me how he was asked by UNDP to produce maps which had already been produced by UNMIT. According to him that happened all the time, (GIS Consultant Ministry of Social Solidarity, 2nd December 2010, Dili). Collected data is most of the time not shared (NGO Ita nia rai representative, 23rd November 2010, Dili), and yet, at the GIS Day Event, the main message articulated over and over again was the importance of data integration. You need to jump

through more than 10 channels to get simple data, argues another GIS specialists (GIS Consultant Ministry of Social Solidarity, 2nd December 2010, Dili). The inscription of spatial knowledge, the interaction between mappers, the world and the map is not a coherent one but sporadic and fragmented.

A DNTPSC member argues that they need a management framework so they get an overview of who is doing what, with what and how (24th November 2010, Dili). There was no "comprehensive legal framework for GIS infrastructure development [or] official coordination body for GIS policy" (DNTPSC 2009). That was partly the idea behind setting up the Geographic Information Group Timor-Leste (GIG-TL). They are a lobbying group with a small fund to send people to Singapore for GIS training. The group defines itself as:

> "The Geographic Information Group (GIG) of Timor-Leste is comprised of government, UN agencies, and NGOs who are actively using geographic information and maps to support Timor-Leste's planning, development and humanitarian response" (DNTPSC 2009).[20]

At the UN Regional Cartographic Conference, the DNTPSC member, argued the GIG group was "virtually the national coordination body [with] experts from government, the UN and International Organizations" (DNTPSC 2009). However, as I contacted the members on the list, a lot said they were just interested in the idea but were not really involved in any specific projects. In my field-notes I wrote: The "GIG group can only be described as loose at best or completely incoherent at worst" (November, 2010).

[20] Also see https://sites.google.com/site/gigtimorleste/, for more information on the geographic information group, accessed 20th November 2013

Although there is an impressive list of organizations using GIS: the Ministry of Agriculture (ALGIS: Agriculture and Land Use GIS and sustainable land management with UNDP), the Ministry of Finance with UNFPA on the census implementation, the Ministry of Health with WHO, the Ministry of Education, the Ministry of Infrastructure producing a road database, the World Food Program on food security and logistics, and UNMIT with its own GIS unit for UN operations (see DNTPSC 2009), they do not amount to a coordinated GIS architecture. When I spoke to a representative of the agency handling the land titling project, they said they did not know about the GIS Unit attached the UN Mission, (NGO Ita nia rai representative, 23rd November 2010, Dili). This occurred several times throughout my stay in Dili. As I was mapping out where mapping happened, I began to make to connections between mapping sites which had previously not been aware of one another. While mapping conceptually fits the notion of a "corporate practice" that is "performed by collectives in unison" (Adler and Pouliot 2011b:8), i.e. they are connected 'by what they do' in practice, even the 'collective' is fragmented and disorganized.

Moving into its situated context by focusing on policy clients for whom maps are produced with specific goals, a further disconnect emerged. Personnel working in policy have a different modus operandi that does not seem to organically connect with GIS. In the beginning of my fieldwork I was confused when I asked political agency staff about maps. They seemed confused too. Why are you talking about maps? There are not that many around, and the ones that are, are often 'wrong' (Aid worker, 30th November, 2010). Another GIS freelancer, who has worked for the Timor-Leste Government and other stakeholder agencies, says the policy people seem to work "more [with] lists than [with] maps" (22nd November 2010, Dili). This notion re-emerged over the course of my fieldwork. The clientele for

mapping who design state-building projects and set the direction for the development of the post-conflict space seemed disconnected from maps.

A freelance GIS consultant argues that maps often visualise problems people do not want to or are not ready to see (Freelance GIS consultant, 22nd November 2010, Dili). In this instance, maps may actually display what has to be dealt with while lists may silence the (spatial) problem all together. Another GIS consultant went even as far as to suggest that the "policy level is not aware of [the] importance of data," (GIS Consultant, 2nd December 2010, Dili). "[On the] governance side the usefulness of GIS is obscure," (Freelance GIS consultant, 22nd November 2010, Dili). "Maps can be generated as blind ideas" (ibid.). There is a lot of talk, too many consultants, no clear vision, and then advisors manipulate whatever data there is. "They keep producing things in fancy design" while there is a real need for map education (GIS Consultant, 2nd December 2010, Dili). This renders the purposiveness of maps ambiguous rather than definitively goal oriented. Given the often bad or no data, a challenging IT infrastructure, not much map knowledge by the policy stakeholders, a disconnected mapping community, and not a lot of capacity to do anything with it, a GIS specialists asks frustrated: "who takes the initiative?" (Freelance GIS consultant, 22nd November 2010, Dili).

Mapping as a logistics tool is not simply an extension of politics. Logistics is itself a site of politics, i.e. struggle. My encounter with GIS mapping in the field problematized mapping as a coherent competent practice and represents a stark juxtaposition to the advocacy and promise described in the Brahimi Report. The interplay of skill, knowledge, materials, and routinized performances that are assumed to make practice hang together are fragmented. While GIS

exists and is used, it is inhibited, sporadic and uncoordinated. The technology here is not a mere extension of Peace Operations. And the knowledge and skill underwriting it does not necessarily hold GIS practitioners together, as some do not even know that other projects exist or what other practitioners do.[21]

Conclusion

GIS mapping is only used sporadically. The mapping community across the mission is not very well coordinated. The political stakeholders are either unaware of GIS mapping as a possible tool or do not understand it. The IT infrastructure is insufficiently supported and so problematizes its use. In this context, talking about the map always meant simultaneously to talk about mapping. Investigating the role of GIS maps immediately leaked into its situatedness constituted by materials, mappers, users, knowledge, skills and its purpose as developing the country to build a strong state and thus to enable sustainable peace. This leaking of the map into its practice problematizes the assumed smoothness as either a tool of scientific progressivism, neo-colonial oppression or even as tool of resistance. Instead, a practice frame invites the researcher to lean in closer to examine the spaces of production and the distribution of how mapping is understood.

On an ontic level, the role of GIS use in UN Peace Operations is limited by poor resource management. That the IT infrastructure necessary for GIS use is either not functioning or inadequate, that there are not enough skilled people to operate the technology, that data collection and software licences are too expensive, points to a

[21] Importantly, this is the case beyond the UN context and relates to GIS mapping broadly in the Timor-Leste Peace Operation.

lack of necessary resources to enable proper functioning. That mapping efforts are uncoordinated leading to duplication and abstract policy development, portends a management deficit. Fixing this chaotic situation of GIS use by merely providing more resources and managing these better, falls in line with Dodge's claim that state-building failures are partly due to a lack of resources (2006).

However, poor resource management does not account for the privileging of representational space over its implementation. The case of decentralization demonstrated how the cartographic imagination is interlinked with the state imagination based on a modernist spatial ontology. The Law of Territorial Administrative Division assumes space to be dead and available for separation by drawing lines on its flat surface. It assumes that the social can be aggregated via an economy of scale approach and then attributed to a polygon, i.e. an area on the map. Massey argues that this modernist conception of space undergirding the imagination of space, "is lacking the contingency which is the condition for that openness which in turn is the precondition for politics" (2005:42).

The practice frame highlights the openness and contingency by extending the representational space into its implementation via mapping. Indeed, as the case of decentralization shows, the imagined and envisioned 'thought out' space is always connected to its implementation. In other words, while the focus on cartographic imagination demonstrates the ways in which the modern spatial ontology, that is representational space, is normalized and privileged in state-building policy, it is never separate from the world. It is always bound up in its extension into the world. And it is in this process of application, of seeking to *build* representational space *to build the state,* that contingency becomes visible.

The mapping projects, delineating boundaries to establish decentralized administrative units, for the purpose of monitoring security or developing the economy, highlighted on the one hand the huge material and human effort that is needed to survey the spaces of interest. On the other, it brought to light how people and spaces resist succumbing to the epistemology and ontology of the grid, in which everything exists in 'plain view' and to being carved up and geographically rooted down. The landscape moves, changes and morphs into different kinds of spaces; it makes it difficult to hold still. People's relation to space is not coordinate-based but enmeshed with kinship relations. This does not attribute the Timorese some sort of anthropologically exceptional status. It just illustrates that spaces in general are lived and experienced. They are real and dynamic. And the extension of the imagined dead space does not always represent a moment of 'triumph' in Massey's terms but at times one of resistance.

It is here that through the extension in the implementation that spaces of difference become visible. GIS is not the smooth implementation device but indeed aids to highlight this difference. Those who map share the understanding that the production of representational space always requires the overcoming of conflict. It requires the separating of the social from the spatial, and to flatten the latter out, in order to root the former in it. Indeed, from a practice perspective the normalization of the cartographic imagination becomes visible and problematized rather than enforced. This means that logistics is political not merely in the sense that it provides the shapes and processes through which to operationalize the state but as site of struggle where the implementation – the how and with what and for whom – is at stake. They exemplify the contingent spaces within Peace Operations and illuminate the heterogeneity of understanding.

This chapter illustrated that while the cartographic imagination informs the spatial state design, in its implementation, spaces and people resist. Moreover, mapping still exists in the shadows, as political stakeholders do not always understand maps, use them or do not sufficiently resource mapping as a professional activity. What has emerged in the investigation of GIS mapping in the context of the field mission is an epistemological fault along the lines of the politics of representation. There is a difference in understanding. The map is considered by some to be a mere image of the world while others understand that it is an abstract model of the world which requires production. This represents the first dimension of the fault, that of the politics of representation. Moroever, political stakeholders regard the map as an available logistics tool to be drawn on when necessary. This stands in contrast to mappers who understand mapping as a political practice with its own important conditions of possiblity. This represents the second dimension of the fault, that of the separation of logistics from politics.

Reiterating Autesserre, it is the extent to which professional cultures can share an understanding (2011) of their work which gives meaning to the work as a whole. The epistemological fault and professional cultures thus play a role in mediating this sharing. The following chapter investigates the constitution of the 'professional' community of mappers in their everyday and how their culture influences the ways in which they interact and negotiate the epistemological fault with their clients. This gives insight into what is at stake by taking seriously the politics of logistics in GIS use in UN Peace Operations.

5 Mapping Professional Cultures: Between Incongruence and Interoperability

"After a centuries of experience using maps […] it is surprising how few people grasp what it means to map,"

(Muehrcke, 2011:148).

The on-going United Nations Disengagement Observer Force mission (UNDOF) in the Golan Heights seeks to monitor the A- and B-Line, representing a buffer zone between Israel and Syria. The Peacekeepers on the ground are highly reliant on maps for strategic mission planning, and mission operations. They are particularly important in recording, finding and responding to incidents in the field. On several occasions, the Israeli Defence Force (IDF) reported incidents in the buffer zone, recorded them and shared this data with UNDOF. However, when the UNDOF Peacekeepers ventured out to inquire into the incident, they could not find the location. The same process occurred with Syria, who also recorded incidents and shared them with UNDOF. The data they were given did not match any incidents. It seemed that either their map was wrong or the incidents did not happen. The Peacekeepers, using maps everyday, were frustrated. Coming back onto base, they spoke to UNDOF's resident GIS officer. She said, well guys, the Israelis and the Syrians both use different projection and datum formats[22]*, the former*

[22] Projections are the process by which the spherical earth is converted to a flat surface. There are three families, planar, conic and cylindrical. These are the surfaces onto which the surface of the Earth is projected if a light bulb could be put at the earth's Center. Any chosen projection always has to make a sacrifice: One can preserve distance in order to be able to measure, preserve shape to enable direction, or preserve the area in order to measure and track changes. Geodesy is the science that deals with the measurement of the spherical earth. The baseline for this measurement is called datum. A datum is a model of the earth's shape which allows for accurate measurement of the earth and place the origin and

the European format and the latter the Palestinian, while the UN uses the UTM projection. If you want to get to the right place you have translate their format into ours….. (Account from Nicole, 30th August 2011, New York).

This experience from the field recounted by a GIS practitioner, is another demonstration of the epistemological fault. The GIS practitioner has a specific understanding of the map, an ability to read it, a way in which to make it intelligible and translate it into the world. Mapmakers have a specific understanding of what it means to represent the world. Their everyday consists of constructing, interpreting and implementing cartographic rules. They negotiate materials and resources vital to map production, from procurement to conducting analysis. The Peacekeepers, on the other hand, do not always share this understanding or ability, making it difficult for them to make the map and the world congruent and thus rendering them unable to traverse the fault. Mapping or the use of the map is not a mere logistical extension of Peace Operations but has its own and yet related conditions of possibility. The epistemological fault manifest in the politics of its representation (the map is (not) the world) and the separation between politics and logistics (mapping is (not) a political practice), sets apart mappers from non-mappers. As ways of understanding mapping, the epistemological fault organizes and mediates the ways in which mapping occurs and is given meaning to. This makes mapping as logistics a site of political struggle in which understandings are negotiated.

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orientation of the coordinate systems. There are hundreds of different datums, different measurement units and methods, (see DeMers 2009).

Importantly, while the epistemological fault mediates GIS mapping it is not determinist. In other words, it is not an *a priori* fact that mappers understand the map and non-mappers do not. Rather it is negotiation processes which affirm or contest the fault and thus produce meaning of GIS mapping. The fault therefore orients rather than determines how current GIS use in UN Peace Operations can be understood. This chapter further examines the nature of the fault, its conditions and mechanisms through which the fault is maintained or traversed. It asks what the specificity of the epistemological fault is as reflected in the professional cultures of mappers and their clients? What would traversing this fault look like? What is there to be known about mapping? What are the conditions which enable or obstruct this learning about the map? And what are the implications of achieving or not achieving the traversing of the fault? What is at stake in the negotiation of the politics of logistics?

Fleshing out the epistemological fault from a practice perspective necessitates a socio-material lens. We know that practice involves "several elements inter-connected to one-another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (Reckwitz 2002:249). This translates into GIS mapping as follows: In addition to "a computer system capable of storing, manipulating, and displaying geographically referenced information […], [p]ractitioners also regard the total GIS as including operating personnel and the data that go into the system," (U.S. Geological Survey, USGS, accessed 2013). GIS has three essential components: "technology, people and data" (Currion 2006), or breaking it down further, "users, programmes, institutions, software, hardware, data providers, trainers, technicians, clients" (DeMers 2009:11). These constitute GIS as a system of moving parts, which crucially require interaction,

interpretation, skilful use and negotiation. What it means to map emerges from this mapping world. It produces a professional culture constituted by particular ways of doing and seeing, knowledge-, language- and skill-sets. It is a modus operandi, a way of being, and a kind of intelligibility.

Autesserre and Rubenstein both argue that the extent to which professional cultures within organizations can share understanding fundamentally influences the cooperation and coordination of Peace Operations (Rubinstein 2008; Rubinstein et al. 2008; Autesserre 2011). At stake in mapping as a relational practice between mappers and clients is thus not just knowledge of the map. The possibility to transfer knowledge is dependent on modes of intelligibility. So for example, can a non-mapper with a different intelligibility see the politics of representation when looking at a map? To what extent must the politics of representation be translated in such a way that it is understandable to someone with a different intelligibility?

The epistemological fault renders practice in the mapping context heterogeneous, i.e. there are mappers and their clients for whom the meaning of these elements are different. In the production process these communities come together to discuss the map as a product, either as a customized commission or, as in the former example, a product for use. Therefore, it is in this interaction that the ways in which the map is understood are encountered and the possibility of sharing understanding emerges. Traversing the fault requires a degree of interoperability between professional cultures, i.e. between mappers and their clients. Professional culture represents a dynamic mode of intelligibility which can either receive knowledge because it can recognize and immediately understand it. Or knowledge has to be translated in order to fit and become recognizable.

Culture, to reiterate however, is not a static deterministic pattern but is "dynamic [and…] actively orients and constrains […] behavior" (Rubinstein 2008:42). It represents the interacting socio-material terrain, which 'orients' the creation of possibilities for learning or 'constrains' them. Understanding the terrain of these cultures at play then discloses the ways in which knowledge of the map can be translated from one register of intelligibility into the other, and the extent to which the fault can be traversed. Rubenstein calls this "horizontal interoperability" (2008). He defines this axis as horizontal because it relates to communication and cooperation amongst Peace Operation agents rather than between Peace Operation agents and the local population. By exploring in greater detail the realm of GIS practitioners' understanding of the map, the chapter outlines the extent to which a movement between these different registers of understanding can be observed. This chapter straddles the fault in order to flesh out the professional culture of mappers, how it orients and constrains their behavior, specifically in relation to their interaction with their clients. It specifically seeks to begin to tease out what is at stake in the struggle of interoperability. In other words, it focuses on the implications of this struggle and therefore logistics for Peace Operations.

The structure of this chapter is comprised of three parts: The first part explores the professional culture and practice of GIS practitioners by focusing on the production process of a topographic map. It outlines the everyday material and epistemological practices highlighting: the nature of their technological expertise, the contingent space for interpretation of cartographic rules as well as their awareness of the political dimension of their work. It teases out their modus operandi, their sense-making matrix and intelligibility. As this study investigates mapping from the point of view of mapping practitioners, the second part focuses on how they perceive the

professional culture of their clients. Narrating stories of their experience interacting with their clients, it sketches out some of the key challenges in traversing the epistemological fault as they are represented by different professional cultures.

The third part then looks at the creative and innovative ways in which mappers seek to create interoperable conditions to enable the translation of knowledge. Accounting for these attempts to traverse the epistemological fault is congruent with Kitchen et al's onto-genetic framework and takes the agency of mappers into account. Introducing the people, the hard-and software, the technicians and clients and their interactions, destabilizes GIS as a smooth operating system, a possible mere "handmaiden" of the United Nations (Chrisman 2005:31). As this chapter and this thesis draw particularly on the data generated with GIS practitioners it gives an insight into their "sense-making of those actions from their own point of view" (Yanow 2000:251). It zooms into the everyday "unfolding" negotiations and translations (Adler and Pouliot 2011a:6) "to understand lived experiences of the realities of the workaday world," (Yanow 2000:251). As such, it fundamentally undermines the ontological security of the map. Conversely, the chapter ends with thinking through the implications of successful or unsuccessful interoperability for the use of maps in UN Peace Operations.

Mapping, a professional culture

Map-production is a system in which materials and bodies work together to produce a map. Know-how and skill are central to making the system work. As a science with standards and rules one could subscribe to the notion that mapping can be done correctly and incorrectly (Barnes 2001). Yanow explores the organizational culture of flute makers who through collective doings learn from each other what it means to make a good flute (Yanow 2000). Observing their

interactions, the materials, and language used she is able to discern a pattern from which it is possible to infer the mastering of the "practice of flute making" (Yanow 2000:253). While similar to Kitchin et al's onto-genesis with emphasis placed on experience, knowledge, skill and sense-making, there is a fundamental difference.

The construction of a flute, as Yanow states, can be mastered. And what this means is defined by the community of expert flute makers who share and practice this knowledge. Mapping however is a political practice in which, although there are standards and rules, what is to be represented and how, is always at stake. The "competent performance" (Adler and Pouliot 2011b) of mapping is not just a matter of technology but a matter of its purpose which is emergent from interactions. Hence, mappers, as this section will demonstrate, are always implicated in the politics of the map. Mapping is a technological as well as a political practice. This combination of technological expertise and political responsibility rooted in their socio-material terrain constitutes their professional culture.

The Making of a Topographic Map

In the following section, I paint a detailed picture of this technological and political culture by means of looking at the production process of a topographic map. I spent hours with staff, explaining the technical details and implications of processes such as ortho-rectification, to remote sensing, and 3D modelling.[23] However, the ways in which mappers talk about production does not follow a linear process.[24]

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[23] The level of detail in this section is necessary in order to thoroughly ground the complexity of mappers' technological expertise and their political awareness.

[24] GIS practitioners did not recount topographic map production in a completely linear fashion. They focused on explaining the complexity of particular processes rather than the whole. That is because some of them focus on bits of the process

Their narratives emphasize: the knowledge and skill constituting the technical craft of map making; the particular mapper mode of being, in terms of how they view and understand the world; and the political contingencies always present in their work.

Importantly, from a practice perspective communities are not constituted *a priori* by their professional identity. Communities are constituted and re-constituted by continuous negotiations on what the meaning of that identity is (Rouse 2007); i.e. what it means to be a mapper. Thus, we cannot assume *a priori* absolute homogeneity of how mappers themselves understand maps but must take into account their own processes of meaning-making. Only when having explored their negotiations on registers of understanding can we then make sense of their interactions with their clients.

Topographic maps are not the only kind of map UN GIS practitioners produce. They make many others, such as thematic maps, general reference, and deployment maps. Currently, it is the GIS Center in Brindisi which is tasked with producing topographic maps for particular areas of interest. The rationale for their production follows the Brahimi Report. In order for mission deployment, strategic military operations, and project planning and implementation to take place, the mission requires up-to-date accurate topographic maps. If these are unavailable, it makes operations, strategically and tactically, difficult. If you cannot 'see' the terrain, you cannot plan for venturing out into it (Steven, 23rd August 2011, New York).

The topographic map or basemap is in terms of geographic information the most basic yet important product. It visualizes the

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and do not execute map production from 'start to finish.' The narrative produced here is arranged in a step-by-step fashion in order to facilitate ease of reading all the while preserving the voice of the practitioners.

geographical features of a particular area and so creates a basis for planning to take place or on which other types of data can be overlaid. At the GIS Center mappers are currently working on two major topographic map projects, one for the Democratic Republic of the Congo and the MONUSCO mission and one for Darfur, for the UNAMID mission. For the former, they produce about 30 maps per year and about 80 maps per year for Darfur (John, 16th November 2011, Brindisi). They are trying to cover these entire areas bit-by-bit, map-by-map.

The understanding of GIS as a system is reflected in the ways in which mappers talk about this process. It involves many people and many different things, says David (15th November 2011, Brindisi). Max explains:

> "The topographic data is labour intensive. It takes a lot of people, satellite imagery and systematic interpretation of an area, very clear guidelines in extracting everything you see in an image that fits the rules of the guidelines. You need a lot of people looking at lot of areas, who are very accustomed to looking at that type of area, for example arid areas of Darfur or forest areas in the Congo […] and who know what to look for and know the data model they input data in very well, so to make sure it is systematic. […] The people on the receiving end of this extraction are doing systematic checks to make sure that the data is exactly how it should be. And then with some back and forth and correction and all.… And then there are people down the road who are getting validated data and are integrating those in big data bases and people who are extracting this data form the database and are making maps, ensuring that the template is good" (Max, 28th August 2011, New York).

This description of topographic map production already complicates an abstract linear understanding of map-production as data collection, analysis, and visualization. As a system it is already evident how many materialities and people have to work together. It is also evident that it requires specific know-how. People need to be

trained in looking at this "type of area." It shows that mapping is not the same in every process; there are "checks" and "corrections" exercised by practitioners. Mapping requires particular skills, amenable depending on the project. In addition to the specific skill set, the technical language used highlights mapping as professional practice. The way mappers look at the world, due to mapping, is different and sets them apart from other professionals engaged in Peace Operations.

Topographic maps (TLMs) with the specificity of a 1:50.000 scale[25] provide information on an area's terrain. They show hydrographic features, vegetation cover, major road networks, settlements and the like. If one were to start from the beginning, the production of a TLM requires ortho-rectification of satellite imagery, extraction of features with generalization according to specific model guidelines (either VMAP2 or MGCP), Quality Control (QC) process, data entry into geo-database, and then finally map production at a given scale. The following unpacks these processes further.

In GIS a base is required. Satellite imagery is now mostly used, states David, although in some missions aerial photography is also available (15th November 2011, Brindisi). Satellite imagery is now in high demand and very popular I am told. Often however, it is understood as a picture, an actual image of the world taken from space, reiterating the epistemological fault. Yet, raw satellite imagery

[25] The map and the earth exist at different scales. Scale determines how much or how little detail you see on the map. Scale 1:1 would basically be the same as the earth. This is called the fraction – numerator (top of fraction), i.e. 1 corresponds to size of the earth in the denominator (bottom of the fraction). Rule of thumb: The smaller the map scale (the fraction) the larger the amount of Earth you can see. (DeMers 2009:24)

requires rectification, or what is here specifically called ortho-rectification. This process accounts for the curvature of the earth, rectifies it and removes distortions present in the image, so that spatial data can be properly displayed. "Without this process, you wouldn't be able to do such functions as make direct and accurate measurements of distances, angles, positions, and areas" (Satellite Imaging Corporation, 2013). The process requires the

> "collection of ground control points (GPCs), obtaining a good enough digital elevation model (DEM) and then using a software that is able to construct a deformation model to accurately georeference each point of an image (as opposed to georeferencing four corners and computing other points), factoring in geometrics distortion (specific to sensor and to sensor attitude during acquisition) and terrain induced distortions (slope, orientation)" (Max, 26th August 2011, New York).

The pictures produced via a satellite are thus not readily used images of the earth. In order for geographical data to be represented 'accurately' and in proper relation to one another, satellite imagery requires mathematical interventions. The translation of the three-dimensionality of the earth into the two-dimensional picture is a manipulation. The world as picture is produced on the basis of mathematical correction. It is rendered calculable within the grid matrix. Ortho-rectification is either done at the GIS Center or entrusted to the company from which the imagery is procured. We tend to use exclusively SPOT 5 satellite imagery, says David (15th November 2011, Brindisi). SPOT stands for 'Systeme Pour l'Oberservation de la Terre,' and is a "high resolution, optical imaging

Earth observation satellite system operating from space."[26] The 5 stands for the version of the current system.

Once a satellite image is rectified, they take various scenes, which correspond to a map sheet and mosaic a subset to that map-sheet. The sub-set must fit together seamlessly, to make sure that the edges match, that the data on the edges can be stitched together. Then they feed it into a geo-database. What is also important in terms of procurement is that the different acquired images are from the same season. One can think of it as a puzzle where different bits need to fit together. In the case of Darfur the difference for its topography from rainy to dry season is significant, so continuity must be ensured. A road might be visible in the dry season while it disappears in the rainy season. From the very start, it is possible to see that what constitutes the cartographic imagination is the product of a carefully crafted production process. The world is rendered knowable via mathematically calculated modelling. And it is mappers who embody this knowledge and enact its skilful application.

A package of the geo-database and the reference or SPOT image is given to the feature extractors. At the GIS Center, these are mostly consultants who are brought in on temporary contracts. Feature extraction – the next step – is about the delineation of relevant objects on the satellite imagery. Extracting means to draw the mouse along a river for example, to 'extract' it as a feature. Generally, this process can occur either semi-automated through software such as ERDAS, where the program already knows what features to delineate,

[26] "It has been designed to improve the knowledge and management of the Earth by exploring the Earth's resources, detecting and forecasting phenomena involving climatology and oceanography, and monitoring human activities and natural phenomena [… and] launched May 4, 2002 with 2.5 m, 5 m and 10 m capability" Wikipedia, available at http://en.wikipedia.org/wiki/SPOT_(satellite)#SPOT_5, accessed 13th July 2013

as major roads for example. However, the software is not always able to comprehensively extract the feature. Then, the mapper must undertake the extraction manually. The rule of thumb during manual extraction is to "extract what you see" (Max, 26th August 2011, New York).

This kind of 'seeing,' that Max refers to, is itself rooted in specific rules, depending on the models used of what and how something is extracted. The feature extractor sits in front of two screens, one displaying the map sheet from which to extract features, the other an image from the enterprise version of Google Earth. The SPOT is the reference image which comparatively always takes priority: "[it] is the king in our feature extraction, at least in terms of our interpretation," (David, 15th November 2011, Brindisi). They can pan and zoom across the images, moving from one world to the next. In front of them on their desk they have a catalogue, listing specialized features. The catalogue gives guidelines on what and how to extract. Extraction shows the always-relational interaction between mapper and technology.

The catalogue is based on a specific data model which outlines the specification. The current model being used for the TLMs is called MIL-V-89032 or short VMAP2. The catalogue holds about 66 different features but on average they only use 16. Some features they just do not expect to find in Darfur, such as swimming pools for example. VMAP2 is the most used model, although recently a new version has been introduced called MGCP TRD 3.0. Not yet publicly available, it is the product of a "multi-national geographical cooperation [… and…] a multi-billion dollar program put together by 20 or so nations to map the world at 50k" (Max, 28th August 2011, New York). It originates from the international military mapping community, outlining the international standards of what and how to extract. It consists of a

club of countries and functions on a sharing principle. Italy for example may produce and contribute data on Somalia and in exchange receive data on Thailand and Vietnam. All data is stored in the same standard at a geo-spatial warehouse in the United States.

David calls MGCP the "new fashion in mapping," (15th November 2011, Brindisi). As a way of mapping, it circumscribes the visualization of the world in specific categories. The world in categories is traded, and stored in one warehouse. It demands 100% coverage, which means that in comparison to VMAP2 there are no white spaces on the map. With VMAP2 and its narrow classification catalogue there might be spaces on the map that are simply not filled, remaining white, whereas MGCP's new expansive catalogue ought to capture most of the world out there.

These data models demonstrate a "transnational 'community of practice" (Adler and Pouliot 2011a), or in this context a trans-institutional community of practice. Mapping experts beyond the UN, across the world share the understanding, view and production of the world in specific categories, the practice of which depends upon their collective agreement. This sharing is enabled by their common language-, knowledge-and skill-set. Interacting with one another does not require much translation from one register of understanding into another. Their terminology is standardized and thus tradable.

Nonetheless, as the shift from VMAP2 to MGCP demonstrates, the kind of categories used have evolved. While mappers must maintain their knowledge and skill via training, his or her application and interpretation always render mapping somewhat contingent. The visual estimation of the extractors in cooperation with the standards set out by the catalogue, together, demonstrate what Yanow calls the "kinesthetic dimension" of practice. It denotes "judgements of hand

and eye (that are both individual and conjoint)" (Yanow 2000:254), in the sense that they are understood by the extractor but also shared with the other practitioners. In this relational cooperation know-how is shared and what is legitimate is co-produced. It is this process which influences the kind of world that is activated in the visualization. The emergence of these possible worlds is thus contingent. Contingency is situated in the space between the standard and the mappers' interpretation of what he or she sees.

This contingency in the production process is socio-material and is exemplified in how GIS practitioners talk about the effort required to make this transition from VMAP2 to MGCP. Moving data from one model to another requires translating of standards. This represents almost an entire new language or a new way of seeing the world and making it intelligible. Although both programs have the same parent, this transition takes resources, skilled people, time, and money. As John tells me, standards are one of the hardest things to achieve in GIS (16th November 2011, Brindisi). It requires agreement and consistency. If standards are not maintained the exchange of data can be inhibited, as not all standards translate into one another. Even the MGCP standards require interpretation. David tells me that when MGCP was first introduced, they set up a web portal for staff to discuss any questions they had in the transition period (15th November 2011, Brindisi). Following rules is not an automated process but requires training, learning and negotiation. The outcome of this negotiation is what is at stake in producing a map. Mapping is not merely a routinized practice but requires reflective discussion over how rules are to be interpreted.

This reflexivity contributing to the contingency of mapping is also evident in the feature extraction process. The feature extraction process begins by following rivers and streams which are visible on

the image. Features can be represented as points, lines, polygons or surfaces. These terms represent spatial data formats: Points are just single dots on a map whereas polygons are areas connected through lines, thus representing fields of any kind of shape. For example on a general reference map a city might be a point and shows its relations, east, west, north, south, to other cities as points. However, on a city map, the same point maybe a polygon, i.e. the area of the city. A line is used for features that have length. Although they might also have width in the real world, like a river for example, its representation as line reduces it to the mere volume of the line itself, (DeMers 2009:18).

Features are thus not just replicated from satellite imagery but intervened upon, manipulated and categorized by giving them a geometrical shape. The decision on what to represent and how depends on the purpose of the map. These decisions are important, as later on in the map the object will be visible based on these formats. Their visualizations contribute to the normalization of what is considered the cartographic imagination. Spatial data formats are therefore not mere categories. Their application represents the potential of the possible worlds to be created. The end visualization is a product of a relational negotiation between the parts of the system, between mapper and imagery, software and database. It represents a skilled yet conscious intervention into the world. As Max explains:

> "each feature class has a definition, extraction rules (yes/no decision whether to extract or not) extraction criteria (extract rivers downstream, bluff lines with cliffs on the right side of them), size criteria (min size for an area, under which no extraction or extraction as a line, same for line and points) information density criteria (how many tree points make a forest, which would be a polygon), a long set of attributes with cryptic names (EXS, CPT, HYD, etc…) numeric values. On top, there are a long set of topological rules (forest and bush area don't overlap, roads don't interest with bluffs, etc…) that have to be obeyed" (Max, 26th August 2011, New York).

While this elaboration emphasizes the rule following, routinized and patterned aspect of mapping practice, GIS practitioners consistently seek to highlight the 'work' it takes to follow these criteria. This careful composition of the world as picture, extracted via the deployment of particular categories, requires holding the world still. The environment and even physical infrastructure change, maybe due to seasons or other events. Thus, the consistency the map displays is the product of negotiating the interpretive contingency of mapping's materiality.

The necessity for agreement on standards, and their skilful implementation is finally also evident in the last step before visualization, namely in the Quality Control (QC) process. As the name suggests, this stage seeks to attain consistency. David says, we expect extractors to make a "topologically clean" first submission which requires a degree of self-QC. "Topology is basically how one feature class relates to another spatially; for example water-enclosed areas or a river and areas feature polygon cannot overlay a land subject to inundation" (David, 15th November 2011, Brindisi). The extractors conduct a series of self-checks, after which an "expert interpreter" takes over the QC.

> "This is someone who in general terms has done a lot of feature extracting, probably started on the project as feature extractor and who seemed to be very good, particularly in terms of interpretation of the image and application of the specialized feature catalogue" (David, 15th November 2011, Brindisi).

This demonstrates again the level of skill that is required, the learning of expertise that is necessary. One must have a "trained eye" to see the world in this way. Moreover, within their professional culture there is also a judgment on quality of precision. Extraction is not just mere execution but requires skill. This is underwritten by the notion that some "seem very good."

Again this process is not *a priori* linear. After negotiations and discussions, staff have developed and documented Standard Operating Procedures (SOPs) or a "workflow" for the QC process. It inscribes an assurance for quality control. This means that the extractor's submission can be sent back and forth three or four times in order to certify the consistency. Thus, producing TLMs is time-intensive. David tells me how he manages multi-phased QC processes and deals with eight or nine feature extractors at a time (15th November 2011, Brindisi). At one point there were even fifteen. As well as managing the amount of people, he has to make sure the documentation is current as well as always trying to develop it to maintain the feature extraction support guide, the quality control framework documentation and other advice for the feature extractors. The elements of the system of materials from software, PCs, to documentations have to work together. Yet the kind of enactment of these elements is dependent on a specific interpretation agreed upon, shared within this community, and embodied and enacted by its members.

From ortho-rectification, feature extraction, to QC process, mapping as a practice has an "aesthetic dimension" (Yanow 2000:254) to it. This is a different kind of aesthetics from which Kitchin et al's onto-genesis is a move away from. Rather than an aesthetic analysis of the map as artefact, this dimension relates to the practice of mapping. As a GIS practitioner states mapping is situated "at the edge of technology and art, [it is] still about drawing lines" (Eva, 15th September, 2011, New York). Using Yanow's notion of "aesthetic dimension" shows that what counts as a legitimate map – "clearly marked" – within a particular community, is established in the practice of mapping. If we understand the concept of 'order' in the practice literature not as the structure of an institution for example, but as the know how, skill and standards which organize map

production, then these always require embodied enactment. As with a structure, the production of this order is always contingent on the alignment and concerted action of the system's socio-material elements.

As we can see here, map-making proceeds along a long line of steps, in which the world is captured in an image, mathematically rectified to make it calculable and its features extracted in categories. Although these steps and categories come as prefigured models, their design, acknowledgement, application and/or extension is dependent upon the intervention of the mapper. Thus, the GIS specialist interacts with digital software, tracing geographical features of the world within which s/he is situated. In the end, although technology is involved, human decisions are still necessary in this process. As Chrisman argues, "someone still clicks that mouse" (2005:31).

The UN follows the TLM50/TLM100 standard. That means the standards for TLM at 1:50,000 and 1:100,000 scale. The commercial definition for TLMs is:

> "Topographic Line Map: It's a base topographic product used by the US military and other nations. TLM is a lithographic map that portrays topographic and cultural features at either 1:100,000 or 1:50,000 scales (TLM100 and TLM50 correspondingly). Feature portrayal includes relief, drainage, vegetation, populated places, cultural features, roads, and railroads. The map is a true representation of terrain detail. TLMs are primarily used by land and air forces in support of ground operations for planning, tactical operations, terrain study, and target acquisition" (Cartographic.com 2013).

Note the notion of "true representation." Now we are able to discern that whatever 'true' means is related to the compliance with specific rules rather than compliance with the world's dynamic complexity.

This is where reflexivity and politics enter the mappers' map production discourse. They are aware that the map is "man-made" (David, 15th November 2011, Brindisi) and that the constant interventions have political consequences. In the conflict space of Darfur for example, they created a new sub-set of feature classes for VMAP2. While they had two settlement classifications, one for native settlement, one for settlement areas, they had to add a third. David describes how the extractors began to see donut shaped rings with a black periphery around them on the satellite imagery (15th November 2011, Brindisi). After discussing and talking to the mission, they agreed these were burnt settlements. Through deliberation they assigned meaning to what they saw, which produced the third category of 'destroyed settlements.'

The assignment of this meaning is however not taken lightly. In interviews mappers regurgitated the questions they posed in the process: Are these just neglected villages which have been abandoned? Some tribes in Darfur practice nomad agriculture, thus these huts may just be abandoned. Or were they actively destroyed in an attack? The Janjaweed in Darfur are known to burn down villages. The categorization is a political judgement. The inscription of burnt villages on a UN map partakes in and gives a narrative of the events on the ground. A political awareness, that is the knowledge that what is inscribed in a map has effects in the world, and is the product of a process in which the GIS practitioner plays a role, can be observed across the examined community of mappers. This example demonstrates the politics of logistics in two ways: First, we see that mapping provides categories which visualizes the world, constituting spaces. These spaces have effects as they represent a possibility for interpretation, e.g. here as sites of violence. Second, and more importantly to my line of argument, this example demonstrates the politics of logistics as site of struggle. While mapping provides

categories to constitute spaces, they are not automatically adopted but subject to reflective negotiation. Mappers talk about the implications of chosing one category over another. This example shows very clearly that the choices mappers make have a real impact on Peace Operations as they inscribe meaning onto maps which in this case would ascribe agency to perpetrated violence.

In another example, Nicole recounts what is at stake in the production of deployment maps which are produced for the Secretary General's reports in order to brief the Security Council on the status of missions every 6 months (Nicole, 30th August 2011, New York). In this case they represent the troop deployment status quo. Indeed, deployment maps are very important, as Nicole states, as they include a depiction of the military deployments of the contributing countries which insist on their proper representation. It is about prestige and showcasing their sacrifice. If a country contributes troops it wants the appropriate credit for it. 'Mistakes' in representation cannot be made as they "can cause anguish" between the different members states (Nicole, 30th August 2011, New York). Sitting in these high stakes meetings, responsible for the representation, one becomes quite aware that "what happens on the map *also* happens in the world" (Eva, 15th September 2011, New York). Eva forcefully states that "people are dying because of lines," (15th September, 2011, New York). The political effects of producing a controversial narrative, ascribing blame or agency to the wrong actors, may incite action. This data shows how mappers here are aware of the potential political effects of their work and discuss these.

This elaboration on the making of a topographic map, intersected by GIS practioners' experiences and descriptions of their work makes evident both the complex technological expertise and political dimension of mapping. It clearly demonstrates that far from a mere

logistical tool, readily available, mapping requires a sophisticated skill set and constant training to attain and maintain mapping capability. Moreover, this section highlighted that understanding mapping means also to be aware of and engage with its always-present political dimension. The socio-material process of representation does not only produce an artefact but does work in the world. The ability to map and understand mapping thus represents a distinct intelligibility. As a profession, it bears a culture. The effects of mapping which impact Peace Operations are therefore present in the categories available to represent the world but also in the discussions of mappers about the implications of the categories themselves.

Negotiating Meaning

So far, it is clear that what mappers do ties them together. They are a community of practice. However, what mapping is, is even for them, constantly at stake and open – to a certain extent – to discussion. What would seem from a practice perspective tacit knowledge, difficult to get at, is at the surface for mappers. It is what they actively reflect on and what is the subject of discussion not only between them and their clients but also amongst themselves. GIS, as 'geography on steroids,' as a merger of cartography and computer power, attracts people from different backgrounds. Within the Cartographic Section, the GIS Center and Field Units, these diverse backgrounds are observable ranging from geologists, and survey specialists, engineers, IT specialists, to human and physical geographers.

Despite the many rules and guidelines, "it is most important to observe that the software and the data do not preordain the results. These resources can be put together in many ways to serve different purposes" (Chrisman 2005, p. 31). These diverse backgrounds insert themselves into the space between these resources and their

application. They influence the ways in which GIS as an information management system is conceptualized and approached. The Cartographic Section staff explains for example that coming from an IT background may focus one's work with GIS more on the data management side of things whereas a geography background may direct the focus more on the thematic and politics side of things, (Nicole, 30th August 2011, New York). As Nicole says, this will lead to very different ways in which data is handled (30th August 2011, New York). John, who comes from an IT perspective states that his main focus is the set up and management of geo-databases, to ensure that they are efficient and user friendly (16th November 2011, Brindisi).

However, designing and deciding on standards, that is the structure of databases, should be defined by experts of the phenomena of interest. From a practice perspective, databases are contingent (Chrisman 2005). For example, how does one define and measure poverty? This is important. John states from an IT perspective: "I can tell you the tools but I cannot tell you the design: I am not architect but a builder" (16th November 2011, Brindisi). How to map is always at stake for them. It is not a tacit but a reflexive practice as the set up of the MGCP web portal and the extension of categories for destroyed settlements show. This furthermore exemplifies the positioning of GIS as political technology between imagination and its operationalization. It is not a straightforward skill set but one which requires negotiation.

A mapper's background – whether geologist, surveyor, or human geographer – will influence the tools he or she uses or the type of spatial analysis he or she does. It will also influences how data exchange is conducted for example prioritizing IT infrastructure over data or vice versa, (John, 16th November 2011, Brindisi). "Everybody has their own tools to arrive to the final product" (Ibid.). The

approach is not necessarily settled and is thus open to negotiation. What becomes apparent is that mapping for mappers involves not mere rule following, not a mere becoming accustomed to a pattern, but a negotiation of their own and fellow mappers' background. These negotiations shape approaches to GIS and are therefore part and parcel of their professional culture.

Negotiating Material (In)compliance

The system framing of GIS emphasizes the materiality of GIS mapping practice. The materialities circulating in GIS have to cooperate in order to achieve maps as "collective accomplishment" (Barnes 2001:31). The management of these materialities also constitute an important part of the mappers' professional culture in terms of how they understand their work and the meaning of mapping. Relating materiality back to Kitchin et al's onto-genesis, the concept of technicity

> "refers to the extent to which technologies mediate, supplement, and augment collective life; the unfolding or evolutive power of technologies to make things happen *in conjunction* with people" (2011b:113).

For mappers there is a material contingency to their work. Technicity, i.e. the material extent to which mapping 'happens,' is not innate to the materiality itself. While Leszczynski's call for acknowledging the limits and potential of GIS inscribed in its materiality, such as the structure of the geodatabase for example, is important (Leszczynski 2009b), it assumes the concerted working together of materialities in the first place. The political nature of logistics does not merely reside in its provision of categories thereby recasting spaces and processes. Logistics as constituted by socio-material processes require negotiation. They are still as site of struggle: As evident during my fieldwork, material cooperation is contingent upon and bound up in the management and administration of what is often inadequate

technology. The inadequacy in turn is again related to the insufficient resourcing of GIS mapping due to its hidden position and misunderstanding as manifest in the epistemological fault. The possibility of mapping is influenced by an infrastructure that is at times challenging or does not work and by people who do not understand maps.

Some staff members at the GIS Center, Cartographic Section and the field units with an IT background fulfil system administrative tasks in addition to their GIS work. Managing the system entails a huge variety of responsibilities. The IT infrastructure which houses and enables GIS mapping struggles at times with compatibility, capacity, break down or disruption. The main software UN mappers use for GIS, called ArcGIS, provided by ESRI, like most other software, publishes new versions. This makes things difficult for GIS mappers:

> "And then you have something significant like ESRI bringing out ArcGIS 10 so you have to revise everything and I haven't even moved to 10 because the current production doesn't work in 10 because they changed the whole way they do symbology. So it is a lot of work to keep this thing going," (David, 15th November 2011, Brindisi).

John also laments the difficulty different versions create. He says, it is difficult to understand but every database version has its own structure and with the structure come different standards: "[…] talking about standards means talking about the same kind of map, the same kind of data, the same kind of database" (16th November 2011, Brindisi). As mentioned before VMAP2 and MGCP come with their own structures. But the problem is that one cannot read ArcGIS10 data in a 9.3 version. This puts in perspective the ambition of sharing data across communities and agencies. Seemingly minor issues, such as different ArcGIS versions, make data exchange at times not only difficult but impossible. Thus, even if data reaches

missions, the different structures of databases may inhibit practitioners to even open and read it. Limits are therefore not merely inherently inscribed in the materiality of GIS per se but are specifically contingent upon the cooperation of different versions enabling the flow of knowledge.

In the missions, infrastructure also intervenes into the possibility of GIS mapping. Not only do software versions inhibit the exchange of data but so does the availability of bandwidth. Mission critical applications, as well as emails, phone calls etc. take up most of the bandwidth, say Mark and John (16th November 2011, Brindisi). "The GIS server is very heavy to be downloaded" which means that mission staff often has to wait a while for images to load (Ibid). "GIS has specific needs" which is not always understood. Mark says "when you ask the Communications and Information Technology Service (CITS) [at the UN Logistics Base] to set up a server, they don't take into consideration that we move a lot of data back and forth all the time" (Mark, 16th November 2011, Brindisi).

This demonstrates again how the epistemological fault mediates the organization of GIS mapping at the UN. Even though you might have data in the right standard, it is not always easy to get it where it is needed (John, 16th November 2011, Brindisi). This is not a function of the materiality of GIS generally. It is an issue related to the administration and management of its materiality which is couched in the context of GIS not being understood. Mappers might not have the right versions, the proper software, a big enough infrastructure to do what GIS can do. Because it is not well understood, it is under-resourced or not resourced properly. Its use and its role are contingent upon the existence and continuance of the epistemological fault. This demonstrates that the salience of the political is directly impacted by logistics.

Moreover, the management of materiality is influenced by the mission environment. Nick and Mark tell me about how their UN offices were attacked in Bunja, in the DRC (14th and 16th November 2011, Brindisi). Laptops, computers, servers, plotters and data were damaged or stolen. In Timor-Leste mappers told me about how because of the heat and power outages, plotters often break down. While it takes months to have new ones delivered interrupting the printing of maps, broken plotters are stored in a room as there is no where to put them. Viruses on computers are rampant. Internet access is rather limited and people use USB sticks as their main way to transfer data from one computer to another. However these are the carriers of computer disease. In Dili, just as with human diseases, people come in with their USBs from all over the world to work in Timor and are either already infected or become infected there and then spread the viruses. This creates problems potentially shutting down entire networks.

Finally, the system administrative tasks mentioned earlier, such as IT maintenance and human resource management "take up all their time" (John, 16th November 2011, Brindisi). An understanding of GIS mapping must include these tasks rather than merely focusing on map-production. David for example states that John is "very technically minded" and would like to focus on GIS application development and analysis but is burdened by this extra work. "People are swamped. We don't have the people," (15th November 2011, Brindisi). In order to keep it going it requires maintenance: Licences, training, contracts, and support are constant jobs. They deal with software vendors, such as ESRI, to maintain the software licences, or planning and implementing the migration of data from an old version to the newer one. This requires the organization of staff training to ensure that everybody has the right skill-set to deal with the current versions of software and hardware.

Questions of material (in)compliance are often considered matters of logistics on an ontic level, i.e. those tasks which require attention in order to keep an operation running, means the solution is to supply more or less of the material. And mapping is usually understood as mere map-production. The fact that mappers' time is taken up by a diverse range of tasks such as having to deal with system administration or managing contracts of consultants is usually not considered. A practice perspective shines a light on the everyday work of GIS practitioners highlighting that these are part of their daily tasks. It also shows how these tasks are couched within a context in which mapping is not very well understood. This fundamentally impacts the role and use of GIS. It is part and a parcel of their professional culture.

Perceiving Client Communities

Having sketched out the constitution of the professional culture of mappers, this section outlines how mappers perceive their clients' cultures. By way of clarification, this elaboration can only go as far as the research participants set out this perception in interviews. In other words, what follows, is not the result of my own investigation or analysis of client professional cultures, as they did not represent the object of analysis. As a consequence, the mappers' descriptions of clients are largely framed by their own lack of understanding and less so by concrete knowledge of their modus operandi. Mappers do not know much about their clients. Nonetheless, the experiences of mappers' attempts to get to know and understand their clients, allows glimpses of different process and intelligibility. It allows for a sketching of how this maps onto the politics of representation and the politics/logistics relationship. This then represents a basis for the possibility of interoperability between cultures discussed in the next part.

What I heard over and over again from the mappers at the various sites was attesting to the difficulty to identify the needs of the client. When asked what kind of map they need, clients often say: Well, I "just want a map," (Nicole, 30th August 2011, New York). David states that people seem completely unaware that not all maps are the same. He says, often I hear "I need a map" (15th November 2011, Brindisi) without giving any specifications. For example: what scale do you need, what information is important, what do you need it for? Particularly the latter question – what do you need it for – requires the translation of a 'political' task into a map oriented framework. The political task is spatialized via the map. This is often difficult and mostly ends up in the claim of I need an idea of a country, region or area. Specificity is therefore absent: the map is a map – it shows the place, no?! This lack of understanding can be extrapolated to the perception of GIS:

> "Most people have the wrong notion about GIS, because most people think GIS just does maps and that's about it. It is about mentality. Its unfortunate that how most people perceive GIS" (Mark, 16th November 2011, Brindisi).

As was recounted numerous times in interviews, what seems to be a common experience with their political clients is the confrontation with the notion that the map is producible by "button-click" (repeated by several GIS practitioners at the Cartographic Section and the GIS Center). People think we just need to flip a switch, click a button and voilà there is the map you need (Lutz, 13th September 2011; Nicole and Eva, 15th September, 2011, New York). The map is not understood as a political technology the products of which are doing work in the world in which, those who determine its purpose and those who make it, are implicated. Instead it is regarded as an image, merely available, standing reserve to be looked at.

The purposive aspect of mapping – one produces maps with a goal in mind – indeed its specificity and functional quality of the map does not always seem to be understood. The notion of the map as giving "an idea of the country" (Nicole, 30th August 2011, New York) alludes to the spatial imagination of a place, area, country or region congruent with the map. As a general reference map it may display its shape, size, capital and major cities, its relational position vis-à-vis other places, countries and regions. It visually contextualizes a place, makes it possible to locate it in the mind. This demonstrates the normalization of the cartographic imagination. The constantly interacting socio-material elements of the system underwriting the map are invisible and/or incomprehensible to clients.

Moreover, the fact that a map is not the place, that what it depicts is the outcome of a particular process in which representational decisions are made, and that these decisions are a) purposive and thus b) have political consequences, are not always understood. Its political impact in the world is not common knowledge. As Nicole, states, a map "is a message" and it depends what message one wants to convey (Nicole, 30th August 2011, New York). David states, "we all exist in this, you know, it is by no means not political working" (15th November 2011, Brindisi). In interviews, I was given a variety of examples demonstrating this lack of understanding the politics of mapping and its purposive quality:

Soon after South Sudan gained independence the Cartographic Section was flooded with requests to provide a map of the new country. Clients requested them for their offices, to display the new member of the international community. They seemed surprised when staff of the Cartographic Section said that they could not produce such a map. The boundaries of the new state had not been officially agreed upon and delineated and thus, the Cartographic

Section did not have the authority to draw such lines. Indeed, this line would represent the UN's official understanding of what South Sudan looks like and what boundaries constitute it. Drawing this line has a direct implication in the world. It is exemplary of Corner's argument in which the map activates, indeed, constitutes territory (1999). The very act of producing a map of South Sudan equates with the making of the state. Staff at the Cartographic Section respects this implication, reflexively aware of the possible detrimental consequences causing conflict. Some of their clients on the other hand are not able to immediately appreciate that. This represents how their clients are either not aware of or do not understand the politics of representation. However, it is in this confrontation, in the explanation of why the map cannot be provided that the understanding of the map can be shared.

And yet, GIS specialists state that they encounter this challenge all the time. In UN HQ meetings in New York, maps appear in presentations which seem to have "just [been] grabbed" from somewhere without thinking about their function or impact (Max, 28th August 2011, New York). Nick says he gets "frustrated" even when military personnel use maps in their PowerPoint briefings which just seemed randomly selected. "They use any map just to give an idea of an area. There is a question of how people use your products," (Nick, 14th November 2011, Brindisi). In the mission, he witnessed maps being used to block out sunlight, or simply used as decoration on the walls. He states vehemently, "maps are not for decoration!" (14th November 2011, Brindisi). The process of producing maps as functional tools, the *work of mapping,* is reduced if not silenced by merely hanging it up on the wall. This represents the separation of politics and logistics in which the latter is a mere repository for tools. These tools are exposable and at times nothing more than a sheet to keep out the sun or an image to look at.

Reading a map for example requires knowledge of its terms of intelligibility. Scott tells me that holding a workshop in the Sudanese mission, he encountered UN staff who had no idea of what a legend meant (13th November 2011, Brindisi). The key to read maps, understanding symbols, scale and thus purpose is represented by the legend. He had to explain the map by breaking it down into its elements, demonstrating that what you see on a map is the product of applying a filter to the world. There are reasons for displaying certain things and not others and for its overall design. Mappers therefore face the dilemma between wanting to advertise and expand their services and having to educate potential clients on map politics and functionality in order to achieve this expansion. This again demonstrates mapping as logistics as a site of struggle.

GIS as a technology faces a similar fate. Although awareness and enthusiasm has generally increased with the proliferation of Google Earth, knowledge of its specificity has not necessarily. Nicole reports a higher demand for satellite imagery. People have become more accustomed to satellite imagery (30th August 2011, New York). The proliferated use of Google Earth or even the display of situation and crisis Centers in military action movies where events are traced in real time may have contributed to this desensitization. As mentioned beforehand, raw satellite imagery requires handling, a lot of storage space and rectification. When satellite imagery is requested, Nicole replies, “so, yes you can have satellite imagery but what software are you using? They don’t understand the logistics” (Nicole, 30th August, 2011, New York). It is treated as if mapping were a matter of mere provision rather than a labour intensive political process. Understanding the constitution of GIS, what it is and what it can do is also met with confusion. As I talk to John about his experience interacting with clients he says:

> "let me tell you a funny story. GIS in the UN is only seen as a section that make maps and that's it [...in a conversation with potential clients on delivering potential services] we introduced ourselves and what we offer and the clients said: We have our own GIS already. Oh really? How is that possible? Yeah, we a have our own TomTom," (16th November 2011, Brindisi).

John laughs. They conflate GIS with a portable car navigation system.

These examples illustrate the lack of knowledge and awareness around maps in the client communities. However, they do not outline the professional culture of the clients. Indeed, for mappers understanding their modus operandi is important to anticipating needs and thus being able to efficiently offer appropriate services. GIS practitioners are aware that what ties their client communities together respectively are different modi operandi. This difference is manifest in language, knowledge and skill sets, constituting a different kind of intelligibility. Particularly with reference to political agencies, much juxtaposition was made between mapping, visual work, data collection, management, and verification on the one hand and writing reports, working with texts and lists, and 'an aversion' to data on the other. What consistently came up was the notion that political agencies just produce reports: "they work text-based and there is kind of a 'the computer is for writing not for graphics' attitude" (Lutz, 13th September 2011, New York). It seems that policy makers and lawyers "would rather draft pages of reports" (Emma, 16th September, 2011). This reiterates the findings from Timor where policy- and decision-makers kept lists of administrative districts as they were easier to deal with. They hid the contested nature of some of the administrative boundaries.

From the interviews it was clear that these statements represented the extent to which mappers could conceptualize their clients

professional culture. Knowledge production centers on a text rather than a map. The artefact consists of words rather than images, its meaning is conveyed linguistically rather than symbolically. The process of knowledge production however is more of a mystery. This was particularly evident around the use of data. Central to map production, exemplifying the encounter with the world and challenges of the politics of representation, the place of data in reports is seen as more ambiguous. Emma picks up a report on the Syria commission of inquiry. She flicks through the pages, stating that she read it all but was surprised that it did not include any raw data. She asks how can a country report not contain any data, or make any statement about relevant data? (16th September, 2011, New York).

In addition to observing the absence of data, mappers also feel that there is a lack of rigor around data handling. The Cartographic Section often receives excel sheets which contain data and are asked to visualize it on a map. However, these files do not conform to any standards and so the data requires translation into a format that makes it compatible to be inputted in a geo-database and thus accessible via GIS. GPS data points come in from NGOs and other organizations but without any other specific information, such as where they were taken, or the spelling of the village (toponamic standards). Max explains that sometimes a GPS point is between three built-up areas and you do not know what it belongs to. It always depends on where you actually take the point and for what reason (Max, 28th August 2011, New York). On occasion they have to try to verify the data via satellite imagery.

These descriptions, by no means, give a comprehensive or satisfying overview of the modi operandi of client communities. Not only are these communities diverse but the point here is to demonstrate that from the mapper's perspective the professional cultures of their

clients, diverse as they may be, are not easily compatible with their own culture and processes of knowledge production. The notion around the use and handling of data, particularly geographic, underlines the assumption that clients do not go through the same processes of encountering the world, extracting, abstracting and modelling it. Or, if they do, they are not as explicitly reflexive about its implications. These represent two dimensions of the obstacles to interoperability: One, the processes and standards are different which means that the communities cannot easily recognize and interpret each other's knowledge. Two, the lack of intelligibility also means that the possible political implications cannot easily be anticipated.

These assumptions were also reiterated, and thus substantiated, by the experience of other GIS practitioners working in the humanitarian sector. Currion, blogging about GIS matters in this sector, argues that decisions by policy-makers are often "not based on evidence, relying instead on experience of past events as their guide to the future" (Currion 2006). When I interviewed Currion, he stated that medium to senior management staff sometimes have trouble articulating what decisions they need to make at a particular point in time (Skype interview, 3rd August 2011, Edinburgh). Messick another GIS practitioner argues: "It's troubling that geographic accuracy continually appears as an afterthought in most decisions about aid programs" (Messick 2004). The concern of non-use of geographic information to inform decision-making or its mishandling is thus one which is shared by GIS practitioners even outside the United Nations, in the 'transnational community' of mappers.

Currion reflects on what are often perceived as reasons for this disconnect:

> "GIS experts tend to lay blame for the 'failure' of GIS at the door of the organizations they are working for, pointing out that these organizations need to change their working practices in order to use GIS properly. Conversely, aid workers perceive that GIS (and, by extension, the GIS community) has failed to live up to its expansive promises, particularly in terms of delivering useful analysis that can inform programming decisions" (Currion, 2006).

The crux of the problem lies in facilitating a conversation around the map in which knowledge can flow from the mapper to the client and vice versa. However, crucially, mappers I encountered in this research project are aware that they do not know much about their clients' knowledge production processes and intelligibility. Rather than 'blaming' them, GIS specialists see it as part of their responsibility to facilitate the conversation. It is up to them to do better, it is their burden, argues Max (28th August, 2011). Yet, how mappers believe their clients perceive them (as a-political) as well as how mappers perceive their clients (as unaware) frames this interaction. In the following, I outline the various creative, persistent and at times playful ways in which mappers try to facilitate the overcoming of the boundaries separating their respective practices. It importantly also poses the question how interoperability impacts Peace Operations.

Towards Horizontal Interoperability

The epistemological fault problematizes the notion of a smooth process in which the 'provision' of geographic information simply flows into policy-making. And yet, as Adler and Pouliot argue, "(in)competence [is] never inherent but attributed in and through social relations" (2011b:6). Professional cultures, while different, do not structurally predetermine communities from sharing knowledge. It requires the translation of this knowledge from one register of meaning into another albeit not being able to completely speak the

language of the interlocutor. Thus, whether interoperability can be achieved is a question of creative translation or even creating a new vocabulary all together.

DeMer's conceptualization of the map as simultaneous question and answer is instructive (2009:37). The map poses and frames the question while at the same time representing answers. Thinking about the interaction between mappers and their clients as a conversation around determining what these questions and answers are is useful. GIS mapping requires translation between the "site-specific knowledge" (Yanow 2000:250) of communities. DeMers argues "you don't need to be a geographer to think geographically, but you need to think geographically to take full advantage of GIS" (2009:16). In this interaction between client and service provider, the map becomes a "vehicle [...] through which knowledge is expressed and communicated" (Yanow 2000:254).

> "A map needs a unique context, a specific vocabulary, and a set of rules that pull of these parts together so that both the map maker and the map reader can understand each other and make the best possible GIS" (DeMers 2009:27).

Here it is clearly evident that the possibility of mapping is dependent upon the ability of mapper and non-mapper to 'understand each other.' GIS mapping then is tied again to the everyday, to the ability of the mappers to communicate the potential of the map while understanding the needs of their clients in order to determine collaboratively questions and answers. The GIS practitioners recount ways in which they go about creating conditions in which this translation is facilitated. They can be described invoking Kitchin et al's concept of onto-genesis which accounts for creative, sometimes playful, indeed reflexive practices of mapping (Kitchin et al 2011b). The map as an outcome of these practices is then contingent upon

them. Thus, these translations are not separate from but integral to mapping.

Nick tells me about his pursuit of new clients during his time in MONUC, in the DRC: He made friends with a staff member from Political Affairs (DPA) and sat down with him/her in the mission cafeteria. Nick says he brought different coloured crayons and a basic topographic map of the region to the meeting. Spreading out the map and handing over the crayons, he said: "you can tell a story with a map. Tell me what is going on in this country?" (14th November 2011, Brindisi). He prompted the DPA person to draw what s/he knew about the country onto the map, to represent their view of the DRC. This moment demonstrates a spatialization of the political knowledge held by the client.

Information of a member of the political community becomes inscribed into the technological artefact which of course too is already political. In this process he seeks to elicit the DPA person to articulate their current state of knowledge as well as the perceived 'problems' in a systematic fashion. These then become spatialized through the map. They are grounded in their location. It articulates its geographical/spatial attribute, always present but until then silent. The politics of the spatial has always been there but becomes explicit here. The narrative about the space becomes itself spatialized. In a way, one could argue, Nick creates a snap shot of the geo-database already in the head of that person. He taps into the already spatialized knowledge that however heretofore had only existed in tacit form. He brings it to light, makes that which is at stake spatially explicit.

Nick then took the map, processed the information on it, the data the DPA person provided with the crayons and produced a draft map. In

another meeting he sought to verify the new map with the DPA person, to make sure he understood and got the information right, before producing a final product. Nick said, this interaction was successful as it provided a useful methodology in showcasing how political information is spatialized and can be displayed on a map (14th November 2011, Brindisi). This particular map was continuously re-produced, remaining popular across mission components. He elaborated on this interaction stating that it tapped into colours and spatial thinking: We can make maps simple, conform to limited translation, in order to make it easier to interpret. But really, Nick argues, maps are kind of innate: We deal with this kind of visualization already in our upbringing learning about shapes and colours. In kindergarten you deal with geometric forms and associate colours.

This is the key to knowledge. It represents the primary learning of human beings, it is very basic to distinguish between forms and colours, referencing the theory of colour association (Nick, 14th November 2011, Brindisi). These thoughts clearly demonstrate a reflexive process. The engagement with the client is not one of routine, a learned pattern which requires competent execution. It is not a question of doing it right or wrong (Barnes 2001). Rather, it demonstrates that Nick thought carefully about how to tease out the needs of the client in a way that was conducive to capturing their needs. Thus, mapping in this context requires innovative practices to facilitate the relational translation between mapper and client.

Another creative way of translating the political needs into spatially compatible information is via the use of metaphors. Nicole tells me how she frames the map as a message and thus asks clients “what is the message you want to give?” (Nicole, 30th August 2011, New York). She explains that there is a primary and a secondary message of the

map which also provides its structure. It entails a process of prioritizing information: what is the most important and what of secondary importance? What context is needed in order to highlight the primary message? What is irrelevant? What is omitted? In a way Nicole taps into the text or list structure, they perceive to be central to the modus operandi of their political clients. They are asked to make prioritization. It aims to extract a focus. It carefully prompts an articulation of knowledge in spatial terms; it poses a political question asked in spatial terms. Nicole seeks to facilitate a shift in thinking from "I just want an idea" to "what do I need this idea for" (30th August 2011, New York). The purpose of the map that is fundamentally tied to the politics of the map requires teasing out. As Lutz clearly articulates "[we are] facilitating information flows through the map," (Lutz, 13th September 2011, New York). In a way it is the mapper in this translation process who can identify and activate the politics of the map in terms of what is written in and out, and what shape the representation takes.

However, interoperability is not always achieved. Mappers acknowledge that these are still difficult questions for their clients to answer. If maps ought to act as functional tools for planning and strategic decision-making then you require an answer to what size, what scale, what objects, what relations for example (Lutz, 13th September 2011, New York). The answers to these questions are vital for the composition and thus significant for the purpose of the map. Yet, language still represents an obstacle. For example, Nick talks about how difficult it is to facilitate communication between the main elements of the mission: the military, the substantive and the support branch in which the GIS unit in the field is situated. He argues that what is needed is an interlocutor, who can speak all languages, who can translate amongst the different parties (Nick, 14th November 2011, Brindisi). Finding ways to allow knowledge to flow

across military, political, and technical languages is not always possible.

As Nick states, you need to be able to translate from one community to another. He exemplifies this by saying that one has to know "what the conceptual difference is between an IDP (internally displaced person) and a refugee," (14th November 2011, Brindisi)? This relates back to John's differentiation between builder and architect. Some can execute a design but don't feel comfortable to draw the actual vision. And yet, as a purposive practice, there is a need to know your clients, to understand their terms and concepts (Nick, 14th November 2011, Brindisi). Nick states that everybody wants more development but we don't know what they want (14th November 2011, Brindisi).

Moreover, while mappers try to come up with different ways to engage their clients, they aim to maintain the limits and integrity of cartographic rules, as they interpret them. For example, Max recounts an interaction with a client: "[he was] trying to tell me how to make maps […] I am not telling you how to conduct an operation so don't tell me how to make maps. Tell me what you need on a map and then I will figure that out" (Max, 28th August 2011, New York). There seems to be a sliding scale of difficulty. "If no one in the office has a clue it is tough to get to them" (Ibid.). When I ask whether it is a negotiation, I am told that it depends; sometimes it is "a complimentary process, that's an input that drives the product into a direction. […] But there is no way I am going to make a river red. Guys want to highlight this or that because that is what he needs for his report, I think that is his call," (Ibid.).

Representing these different experiences of interaction serves to illustrate the ways in which mappers seek to produce the conditions in which knowledge can flow across the fault. They think about ways

in which to tease out the needs and priorities of their clients in order to spatialize these and represent them visually. At times this works and methods are invented that seem conducive for both communities. At others times, language barriers, exemplifying the constitution of professional cultures, remain. GIS practitioners and their clients are unable to understand each other. Making congruent the needs of the client with the possibilities GIS has to offer can remain difficult. However, we can see from a practice perspective that the epistemological fault is negotiated. It does not *a priori* condition interaction. Practice sometimes allows communities to traverse its divide.

The Stakes of interoperability

Having outlined some of the ways in which mappers engage with their clients, the question naturally arises as to what is at stake in achieving interoperability? What does it even mean and why is it significant? I will very briefly set out the implications of interoperability for a) understanding the use of GIS in Peace Operations and b) understanding the politics of Peace Operations. Both of these serve to highlight what is at stake in taking logistics seriously. First, exploring interoperability between the mappers and clients in this research project demonstrates that GIS use is dependent on the sharing of understanding. For the time being, while mappers are able to come up with creative ways to facilitate the traversing of the epistemological fault, it nonetheless still mediates the understanding of GIS. Mappers are still understaffed and resourced, and politics and logistics are still understood as separate. Many clients still do not understand maps well. As a consequence, interoperability represents the possibility to expand and proliferate map knowledge and thereby promoting its use.

Moreover, the flow of knowledge in an interoperable conversation is dialogical and enables reflexivity. Not only may clients learn about the technological and representational potential, limits and implications of GIS but they also have to reflect on their own political endeavours to be inscribed in the artefact. Mappers may learn about how clients work and in this process also reflect on their own processes and political effects. Yanow, in her research on the flute making company argues that in the collective process of making flutes, the flute itself becomes a 'vehicle' through which knowledge is expressed and communicated: "The knowledge was learned in the acts and interactions, the speaking and handling and working, of making flutes — that is, in the common practice of becoming-and-being […] flute makers" (Yanow 2000:254).

Yet, she, as a lot of other practice theoretically informed scholars term this learning, the practical understanding what it means to make a flute which is gained in the process, as tacit. It usually only becomes reflexive and explicit in the interview. For mappers, because of mapping's assumed a-political status, the necessity of its explanation and promotion makes it a reflexive practice. There is a possibility for "mutual education: you have to understand the demands of your clients but they require the know-how to articulate these" (Lutz, 13th September 2011, New York). What is at stake in interoperability is the (re-)negotiation of meaning: the political client's way of being produces knowledge which encounters the framing of the GIS practitioner's way of being and understanding of GIS. They become merged producing, as in Nick's case, a spatialized political story.

Given that the mappers themselves constantly discuss what is at stake in the map, regarding standards and analysis and given the interaction between the communities of practice, the mappers and

their clients, requiring explanation and negotiation, it is a reflexive, articulated process. This means that it is in the discussion, asking each other questions, that assumptions on both sides can be articulated and questioned. Moreover, it is gaining the knowledge that the map is a series of decisions which can be embodied by the client. This fundamentally raises the questions of what this means for Peace Operations. Channelling Sørenson's call to engage with technology constructively and critically, we must account for both possibilities. Indeed, a 'shared understanding' of mapping holds the possibility for difference.

Mapping may become a more value-conscious practice in which clients are aware of the map's politics of representation. By becoming familiar with the categories and processes of logistics broadly and the map specifically and becoming aware through conversations with map-makers of possible consequences of chosing one category over another, a more ethical practice for Peace Operations may be possible. Thinking for example back to the decentralization project in Timor-Leste outlined in chapter 4, we could see that the clash between socio-spatial realities and the mapping project was articulated by mappers. There is a possibility for these narratives to become more acceptable leading to more bottom-up mapping projects in which local communities could 'represent' themselves. Indeed, these conversations between clients and map-makers on the politics of the map may create space for the local realities and alternative narratives which explain these. Heretofore, as Autesserre has argued in her book on the intervention in the Congo, these alternative narratives were drowned out by an altogether top-down elitist peacebuilding culture (2010). Shining a light onto these clashes and contingent negotiations may give them more traction. This is a 'constructive' possibility of achieving interoperability. Peacebuilding may become more sensitive to local realities, social and spatial.

Yet, we cannot forego the 'critical' sensitizing frameworks outlined in the beginning of the thesis. United Nations Peace Operations have had a somewhat problematic track record, because they failed to create conditions for sustainable peace. Moreover, Peace Operation universalist policies and implementation methods bred resentment in local populations of post-conflict countries. And again, we can refer to Autesserre's argument about an existing predominant top-down peacebuilding culture which can be invoked in opposition to the constructive argument. Understanding mapping and its technological possibilities better may enable its instrumentalization. In other words, moving from non-use to conscious use does not necessarily imply more ethical use or indeed an engagement with local realities. Mapping may just be used more efficiently (by funding and resourcing it more) and more effectively (operationalizing elitist goals within the constraints of the technology).

Importantly, Sørenson's call for critical and constructive engagement is a move away from binary politics where technology is either this or that – progressive or oppressive. Thus, these two possibilities outlined above are not mutually exclusive paths but always simultaneously present possibilities in the contingent conversations between map-maker and client. This is the logic of practice – it represents the possibility of acting anew over and over again. It is in this way that mapping as a site of struggle is part and parcel of the politics of Peace Operations. In the introduction to this thesis I argued that the response to the problematic track record of UN missions was twofold: The United Nations pursued a competent performance agenda by trying to increase efficiency and coordination through the application of technologies, such as GIS. Parts of the academy turned towards 'the local' in order to investigate more indigenous and thus less controversial recipes for peace and security. The UN's response thoroughly separates politics from logistics, while the academic

response more or less ignores logistics all together. Interoperability shows that these conversations around the map articulate the goals of Peace Operations.

As Adler and Pouliot argue, the politics of practice are about the struggle to achieve political validity and legitimacy (2011a:21). Thus far, the data has shown how mappers lament the lack of political legitimacy their work is attributed. We have also seen how policy-makers conceive of maps as normalized, unaware of their politics of representation. Unearthing mappers' struggle for legitimacy and illustrating negotiations to achieve interoperability puts the epistemological fault at stake. In other words, what is considered legitimate and valid knowledge is questioned. The question of legitimate knowledge should be framed as constant negotiation of politics and logistics. Politics and logistics produce knowledge and legitimize it in the interaction of professional communities. The politics of Peace Operations is thus not *a priori* oppressive or progressive. It is in the case of GIS use contingently dependent on the negotiation of the epistemological fault.

Therefore, mappers are part and parcel of Peace Operation practice. Politics is not confined to political effects in the field. Politics occurs in the interaction between mappers and clients as they negotiate what is legitimate knowledge. The epistemological fault represents a space which divides, but at the same time, a space which brings together. This makes politics contingent. Mapping is, and will remain an abstracting process. The map is a model. It is always a lie as Monmonier argued (1996). If interoperability is achieved, the map as lie is exposed. And mappers are able to outline some of the political implications of representation and confront their client. The agency of mappers is crucial in this context, affirming Adler and Pouliot's claim that "practitioners [are the] ultimate performers" of practice

(2011a:15). Peace Operation agents are not merely represented by policy-makers. Mappers are part and parcel of Peace Operations. Their work has political effects not isolated from their clients but is negotiated with their clients. Thinking about the politics of Peace Operations requires a 'thinking together' of politics and logistics.

Conclusion

GIS mapping is not a mere activity but as work, requires "effort [and] acquired competence" (Smith, 1987:165). In the spirit of this thesis, which seeks to draw out spaces of contingency, the practice perspective also demonstrates that mapping is not a foreclosed representational practice. The application of standards and rules, indeed their creation, requires negotiation, agreement and enactment. In all of these processes possibilities of difference emerge. The meaning of mapping and its role is produced in interaction.

This chapter fleshed out the constitution of mappers' professional culture. It outlined the production of their understanding of the map and the intelligibility which orients, rather than determines, their behavior. This culture, I sought to juxtapose with the client culture, if albeit, from the limited perspective of the mappers. These two cultures, framed as practice, represent the intelligibilities of mappers and clients at stake in their interaction. It focused on the extent to which they can be interoperable, to achieve a 'shared understanding' of the map as political.

The first part of the chapter had to do a lot of description work. This was necessary in order to capture the complex, sophisticated and dynamic constitution of their culture. Following their explanation of a topographic map production, the embodiment of their specified skill and knowledge of GIS, the always-present technological and political entwinement become evident. They have to negotiate rules and

standards, materials of the technology and amongst one another how to enact, interpret and manage the GIS system. Its meaning is contingent. Yet, in this section too, the epistemological fault was still evident. It mediates even the availability of resources and frames the task of system administration.

Mapping is a relational practice. The purpose of the map requires the input of the client for whom it is produced. By recounting some of the mappers' experiences of their interactions with clients, the chapter demonstrated that the client culture is thought of as different. Mappers do not know much about the meaning-making processes and intelligibilities of their client communities, not least because they are diverse. This represents a problem as they know that only if they can understand their clients' needs, are they able to meet them within the technological limits of GIS. The key difference in intelligibility is associated with the map as a model, reiterating the epistemological fault. Producing texts and reports which do not directly reflect the same sort of data collection as mapping, does not seem to throw up representational questions. Data collection and visualization processes make mappers aware of technological possibilities and political implications. Mappers state that this does not compute easily with some clients. This outlines how mappers perceive the professional culture of their clients, framing interoperability.

In order to create the conditions to traverse the epistemological fault, mappers take on positions of translators. From an onto-genetic perspective, mapping here shows the innovative and at times playful ways in which the world is rendered visible in particular ways. They create methods through which data collection and abstraction or visualization processes can be demonstrated without being too technical. This was evident in Nick's example of drawing with crayons

on a map or Nicole's use of metaphors in order to get to the story the map ought to tell.

I have argued that what is at stake in achieving interoperability is twofold: on the one hand, it holds the simulateneous possibility of ethical or instrumental map use; and on the other the possibility of mappers achieving political validity, a recognition that they legitimately contribute to the Peace Operations. As the data has shown, in this interaction, in which exchange and "mutual learning" can occur, what is legitimately held as knowledge becomes articulated and questioned. Mappers ask, 'what message do you want to convey.' In this process of what should be visualized or not, assumptions are made explicit. The politics of the map are therefore not merely rooted in its representational frame. In the interaction, the understanding that maps inscribe particular assumptions and are the result of complex production processes become more apparent. As such, mapping as a practice is part and parcel of the politics of Peace Operations.

Overall, this chapter works to problematize the smooth technological determinist narrative of mapping as available and with particular political effects (whether progressive or oppressive). Logistics is political with contingent effects. I showed that its effects are not only not intrinsic to the technology per se but that they are always produced by the system of GIS and all its elements, from materialities to practitioners and users. Indeed, what kind of effects are produced, from where they originate and who carries responsibility for these effects, depends on the understanding of GIS. The following chapter picks up the production of order and investigates how the epistemological fault influences the organization of GIS use in the institutional context of the United Nations. It demonstrates that the issue of understanding the map and mapping as political or logistical

has far reaching organizational and functional consequences. In short, the ways in which mapping is understood reflect how GIS mapping is placed and used within the United Nations. At the same time, again emphasizing the nature of practice, the chapter highlights the ways in which mappers seek to traverse the fault and thus confirm or contest this organizational set up.

6 Organizing GIS @ the UN: On the Tenuous Relationship between Politics and Logistics

Mapmakers have to decide what of the world to represent and how to represent it. They have to encounter the world and hold it still in order to extract data. These tasks by themselves make mapping contingent, as it requires a concerted effort by all elements, material and human, to work together in order to produce a map. However, this environment in which mappers map is not isolated from but set in relation to that of their clients for whom they produce maps. The set of mapmakers' concerns, such as the politics of representation, are not intrinsically also concerns of their clients. In fact, from the clients' perspective maps are often considered nothing more than an artefact with intrinsic meaning, namely that it represents the world. It is nothing more than a factual tool to be drawn on in order to enable evidence-based decision-making and operationalize political projects. In itself the map is not considered political or even the outcome of a sophisticated managed process. This divide in understanding represents the epistemological fault.

At the heart of this fault sits the separation of politics and logistics. The governance logic regards politics as the realm of substantive work where visions are created and plans are hatched. Politics in the context of Peace Operations is associated with the type of political system to be imposed in order to ensure sustainable peace. The dominant form has been the Liberal Peace of market democracy. Logistics on the other hand represents the technical realm, a repository of material tools, available to operationalize the political plans. The almost all consuming importance vested in 'political' decisions render these tools themselves without any political conditions of possibility. They are either appropriate for a task or not.

From this perspective logistics would have no purpose without politics. Politics and logistics are arranged in a hierarchical relationship in which separate from one another, the latter is subservient to the former. This arrangement influences the ways in which GIS is institutionally organized in the United Nations.

This chapter further explores the extent to which the epistemological fault mediates the meaning of GIS mapping in its institutional setting. Indeed, the institution is an instantiation of practice, as Adler and Pouliot argue (2011b:6). In other words, the move from the field to the institution occurs within the practice terrain. A practice perspective jettisons realist (see for example Mearsheimer 1994) or rationalist (see for example Keohane 1984) interpretations of the UN which assume its boundedness as an actor and which is thus able to competently employ a technology as a means to pursue ends. Rather, from a practice perspective "organizations are specified networks of associations, […] an assemblage of ties, relations, connections and associations" (Latour 2005:99). An institutional architecture is never a solid structure. Clusters, horizontal and vertical arrangements always require production. Necessarily, a practice perspective requires the investigation of the production of GIS organization within the UN's networks of associations. This chapter shows how these networks organize around and are mediated by the struggle over negotiating the relationship between politics and logistics.

The images below depict the sites I visited, the spaces and offices where GIS mapping occurred in Dili, New York and Brindisi. GIS is not a mere science with the "view from nowhere," (Shapin 1998), or where technology is abstractly simply available. Its use is organized by allocating it a position within the institution. Mapping offices have a physical presence and a presence in the institutional structure. Both presences are designed to enable the provision of the service of

map- and geographic information- production. Yet, the meaning and working of this structure, are constantly negotiated in practice The negotiation of the relationship between politics and logistics, as separate or co-constitutive, lies at the heart of these negotiations.

Fig. 8 UNMIT Mission, Dili, Timor-Leste

Entrance to the UNMIT Base. Source: Picture taken by me during my fieldwork November 2010

Fig. 9 United Nations General Assembly, New York, United States

Source: Picture taken by me during fieldwork in New York, August 2011.

Fig. 10 UN Logistics Base, Brindisi, Italy

Source: Aerial image, available at http://www.unlb.org/gallery/big/2005_0105Natale20040102.JPG; accessed 28th December 2013

Viewing the UN not as a structurally determinist actor but as a field of practices where different professional cultures interact opens up spaces in which mapping and its relationship to Peace Operations is negotiated. It is possible to investigate how mapping is made sense of. The chapter demonstrates the affirmation and contestation of the epistemological fault. It shows, on the one hand, how the understanding of mapping, as logistical tool, separate from politics organizes its institutional set up, while on the other, it takes note of the ways in which mappers seek to promote the co-constitution of politics and logistics. Thus, neither the UN nor the GIS practitioners solely determine the role of GIS. It is in the everyday interactions that understandings are produced and shared. This chapter shows how this assemblaged organization of mapping in the UN is mediated by two understandings: Politics is separate from logistics and politics and logistics are co-constituted.

Building on artefacts, such as UN documents, reports, websites and internal UN PowerPoint presentations on the one hand,[27] and interview data on the other, I seek to sketch this institutional context and how mapping is situated within it. It focuses on the place of mapping in the UN, its specific sites, and opens up sense-making and negotiation processes from the mappers' perspective. It aims to provide an insight into the everyday struggles, how their work is framed and how they understand themselves in it.

As this thesis is concerned with disrupting linear accounts of mapping rooted in inherent assumptions of GIS, emphasis is placed on accounts of staff's experiences and 'shared understanding' of working at these sites. This represents a different starting point from what may seem an unproblematic evolution of technological progress at the UN as is demonstrated by the advocacy of GIS in the Brahimi Report. Examining mapping as a situated everyday practice enables a disclosing of the contingencies, uncertainties and challenges which emerge from it. By examining how cartographers and GIS specialists recount and negotiate their institutional location, and the institutionalization and conceptual development of GIS this chapter demonstrates: GIS is either not understood or ignored by its clients. It is institutionally marginalized and separated from its political clients.

The chapter is separated into three parts: the first part establishes and illustrates the separation of mapping from politics by sketching its history at the UN. It focuses particularly on the creation and evolution of the Cartographic Section as recounted by mappers. This

[27] Most of these materials I was given during my fieldwork and interviews with research participants. Some of them were written on during interviews and conversations. Participants used them to explain their location within the institution or the work they were mandated to do.

historical excavation shows how their constant movement within the institution, always with a rather low profile and hidden in the shadows, mapping always sat somewhat uneasily between politically purposive and mere logistical support work. The second part delves deeper into the process of GIS institutionalization at the three sites (Cartographic Section, GIS Center and GIS field units). It outlines the current conceptual and institutional organization of GIS which underwrites the separation between and prioritization of politics over logistics. However, a practice perspective gives insight into how this institutional set-up is negotiated. On the one hand, mappers somewhat cater to this separation in order to gain and maintain new clients within the current set-up. On the other, they contest the separation as they see their work not as merely technical but also political. The organization of GIS at the UN is intersected by the negotaiton of the epistemological fault. Thus, the fault is not a structurally determining feature. In other words, the mappers' agency is not *a priori* constrained by this organizational separation. The final section fleshes this notion out by demonstrating how mappers nonetheless work together to mediate the epistemological fault. They lobby other departments to overcome their institutional isolation and expand their clientele. These three aspects work together to demonstrate the institutional contingency of GIS as mediated by the epistemological fault. It shows that logistics is a site of struggle over legitimacy.

Mapping the Orphan

When I was at, what is now called the Cartographic Section in New York at the UN headquarters, I traced some of this history of UN mapping through conversations with staff who had either themselves bore witness to it or knew and had met staff who had. This history is one which privileges 'the voice of the practitioner' (Bueger 2011a). I

sought to investigate where mapping as an activity started institutionally, in which contexts it developed and how it evolved into what are now the sites I visited: The United Nations Cartographic Section at the UN Headquarters in New York, the GIS Center at the UN Logistics Base in Brindisi, Italy, and the GIS Unit in Dili, Timor-Leste (one of the thirteen GIS field units attached to Peacekeeping missions).[28] Taking a historical perspective means to investigate the "generative relationships that made them [i.e. practices] possible, as well as the socio-political processes that allowed their diffusion" (Adler and Pouliot 2011a:23). In this big machinery that is the United Nations, 'a network of associations' where does mapping fit? What is its heritage? How is it understood as practice within a field of other practices? What gives it is specificity? How is the order in which it sits produced?

One of the most detailed accounts of the journey of mapping stems from conversations with the section's eldest, James, and last traditionally trained Cartographer who had been with the Section since 1988. Having spent several hours together and sending emails back and forth, we co-constructed the history of mapping particularly the evolution of the Cartographic Section, trying to capture some of his institutional memory, if in a rudimentary fashion. Beginning with bullet points we tried to catalogue where and how mapping started at the UN and how it evolved from there. In this process, and corroborated by other Cartographic Section staff members, I engaged in a mapping process, tracing development and making connections. Thus, far that had not been done. As mentioned previously, mapping

[28] With an additional political mission in Afghanistan, UNAMA. See http://unama.unmissions.org/default.aspx?/, accessed 31st August, 2013. I only visited UNMIT's GIS Unit in Dili, Timor-Leste

occurs in a variety of sites at the UN[29] and so this does not represent an all-encompassing history. It stems from the staff I met at the Cartographic Section, their memories and the meanings they attribute to it and specifically focuses on mapping in the context of Peace Operations.

As a history, it represents a sort of 'habitus', a shared and collectively owned embodied experience or narrative about what it means to be a mapper or what it means to map in the UN and for Peace Operations. Thus, retelling this history gives an insight into and provides the context for their mode of being, and sense making. This produces an understanding of mapping which "denaturalizes" its taken-for-grantedness, as technology merely available to be drawn on, as 'standing reserve,' (Adler and Pouliot 2011a:23).

Some of the cartographers at the UN call themselves "orphans" (stated by several GIS practitioners during my fieldwork). Mapping has no real home, is treated as an afterthought and whose status within in the institution is ambiguous. Its institutional location over the years has constantly moved and institutional memory never been inscribed. The historical narrative produced here demonstrates that while maps and GIS have been relevant to and indeed part of the practice of political Peace Operations, maps and GIS have been institutionally separated from political activities and thus marginalized. This is based on an artificial institutional separation between what is considered a matter of technological support on the one hand and matters of politics on the other. A privileging of politics over technology enforces this separation.

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[29] Such as risk and disaster management via the Office for the Coordination of Humanitarian Affairs (OCHA) for example.

The first UN map was produced by a freelance Cartographer just after the end of WWII, says James. However, an actual Cartographic Unit was not established until 1952 and at that point only employed one Cartographer. At this early stage most maps focused on deployment, displaying troop location. They were intended for situation briefs and for publication in the Secretary General's Report. Up until about 1990 these maps were all drawn manually and so required trained staff in the cartographic discipline. The second ever map produced which established the first link to Peace Operations was one for the Peacekeeping mission in the Egyptian Suez Crisis in 1956. Slowly the unit began to grow. When James joined the Unit in 1988 it employed five members of staff, one chief, two cartographers and one cartographic assistant. Their main task was to continue the production of deployment maps. One-to-two pages in size, they were still published in the Secretary General's Report, informing on the state of the missions. The function of the map as informing on the state of missions was absolutely essential to the Secretary General's briefings. Maps were expected to represent a part of the briefings. Yet, they were not given further thought as artefacts and practice of their own significance. Maps are deemed so natural, almost obvious, that nobody was really aware of the UN Cartographers or the work they in fact did. As the following will show, the understanding of mapping as natural, rendered its institutional position arbitrary and ill suited for what is according to mappers a political practice, part of politics, and thus ought to be reflected in its position.

In these early days, the unit was located within the Department of Conference Services in the Publishing Division. In this context, maps were considered UN publications. However, not all maps were available for public consumption but instead were considered classified material. This demonstrates the uneasy categorization of mapping as at once so natural to be situated in an 'a-political'

department while also acknowledging that some maps are too sensitive, 'too political' to share. This already rendered the situating of mapping in the Publishing Division as conflicting. When in 1995 the Department of Conference Services was abolished, the Department for Public Information, a concomitant library and the Publication Division were created. The Cartographic Unit thus moved into the Department of Public Information and became a Section,[30] again growing in size. This move continued and even manifested the ambiguous status of mapping. As a member of the current Cartographic Section points out, who worked in the section when it was situated in the Public Information Department: what maps were was contested at the time - were maps really public information? (Eva 15th September 2011, New York). It demonstrated a discrepancy. Their location did not attribute importance and even security measures to their work. On the one hand, maps were categorized as public information, as informative images to be looked at, and on the other, as political artefacts too sensitive to share.

And yet, staff began to feel under pressure due to increasing demand (Eva, 15th September 2011, New York). Indeed, the portfolio of the Cartographic Section began to significantly increase from the early 1990s onwards. With the introduction of peace-building under Boutros Boutros Ghali, and the undergoing state- and nation-building missions, demands for maps grew. Missions, operating particularly in remote environments, required topographic information for their strategic and tactical planning. Demand and thus involvement steadily increased. During the first Gulf War, reports were needed on casualties and force locations in the field. The

[30] UN entities range from the smallest unit, to service, director or a service, to division and then department.

Unit produced maps for the reports on the outcome of the Iraqi occupation of Kuwait. They were published as books, representing damage to the land, businesses, infrastructure and the environment. They also included the depiction of planted land- and sea-mines. Thus, the maps produced a visualization of the status quo, giving a vital view of the lay of the land.

Subsequently, the Secretary General nominated a cartographer to head the Iraq-Kuwait Boundary Commission (IKBDC, 1991-1993) for demarcation. The Unit also became involved in the United Nations Transitional Authority Mission (UNTAC 1992-1995) in Cambodia, with the task to produce maps for the election-monitoring mission. James himself visited the mission twice with the assignment of assessing the validity of available maps, how to collect data, visualize settlements, and to allocate possible polling stations accordingly. Upon his second visit, a cartographic team was established with nine UN volunteers (UNVs). Indeed, it was in UNTAC that GIS was used for the first time. After Cambodia other electoral missions followed in Mozambique and in South Africa. James states that with the establishment of big missions such as UNTAC and the United Nations Protection Force (UNPROFOR) in Croatia and Bosnia in the 1990s it became increasingly recognized that cartographers, their skills and maps were important in active military and civil (electoral) missions. It just "could not be done without maps," (James, 16th September 2011, New York). These developments illustrate the partial recognition of the co-constitution of mapping technology and its political purpose. Rather than a tool for operationalizing political projects this acknowledgement of their necessity highlights their intricate role in setting out the conditions of possibility of these projects. 'At home' however, despite the growth in demand for maps, emanating from their use in Peace Operation missions, the

institutional status of mapping maintained its separation from politics.

This separation only seemed to be confounded by the advent of GIS. In 1993 James was invited by the Under-Secretary for Political Affairs to report on the experience of using GIS in UNTAC and its implementation in UNPROFOR. As a result of the meeting, it was suggested for the first time to create professional GIS Teams to accompany big mission such as UNPROFOR. Overall, geographical information became increasingly recognized as an invaluable asset in the field. Nonetheless, around 1998, the Public Information Division was renamed Outreach Division, again implying the status of maps as public consumption material. As James and others stated, they were simply situated in the "wrong department." In interviews, mappers stated that they were frustrated with this discrepancy between growing demand and lack of acknowledgement of its role in politics, being institutionally relegated to publication status. Mapping is not only separate from politics but is also of secondary importance.

The proposal initially considered under the Under-Secretary for Political Affairs, was again picked up during Kofi Annan's tenure. Mr Annan asked the chief of the Cartographic Section in 1999 to produce a map representing the status of the international boundaries on the African continent. I am told his interest stemmed from his assessment that contested boundaries and the lack of demarcation efforts led to conflicts across the continent. As a consequence, the then chief of the Cartographic Section proposed the establishment of a database on international boundaries to which Mr Annan agreed. Thus, the portfolio and expertise of the Cartographic Section increased yet again. In 2000 it became involved in further boundary issues between Eritrea and Ethiopia as well as between Nigeria and Cameroon. Mapping increasingly became a tool for problem-solving

because of its visualization powers. Mapping was implicated in peacekeeping, peace-making, and peace-building missions. GIS technology had been used by a variety of units, including the Cartographic Section at least since 1995. However, these efforts were not coordinated. Generally missions exhibited weak geographic information infrastructures. Mappers recall that they struggled to even attain up-to-date general topographic maps. In post-colonial countries, available maps often represented colonial boundaries and infrastructure, rendering them useless if not problematic for current mission planning.

According to Reckwitz, practices also include "states of emotion [and] motivational knowledge" (Reckwitz 2002:249). Mappers were frustrated about the lack of understanding of their work. They were motivated to make the argument for the benefits of GIS and to outline what they could bring to improve mission affairs. The chief of the Engineering Section within Department of Peacekeeping Operations (DPKO), proposed to integrate GIS units into field missions, to provide on site geographic data and map production. This represented a move to integrate the technology into the politics it 'ought to' serve. This proposal however, came outwith the Cartographic Section and from within a technical section within a political department. The chief's experience with GIS convinced him of its utility and the necessity of it being close to those who determined its purpose. Shortly after, the Brahimi Report's advocacy for GIS, to which the Cartographic Section contributed, also underlined the chief's petition. This represented an official acknowledgement of the technology's benefits to missions inscribed into a document.

After an initial lack of support, the Field and Administrative Division agreed to the proposal and made funds available for a Pilot Project which started in February 2001. The project entailed the

establishment of three GIS units attached to the Peacekeeping missions in the Democratic Republic of the Congo (MONUC), Sierra Leone (UNAMSIL), and Eritrea/Ethiopia (UNMEE). At this point, the pilot project was still administrated by the Engineering Section within Department of Peacekeeping Operations (DPKO), completely separate from the Cartographic Section. The growth of the GIS infrastructure was ad hoc and its institutional growth tied to the petition and interest of particular members of staff who managed to enable a proliferation of their understanding of GIS. Recognition was therefore dispersed and related to people using it or coming in contact with it. And yet, the growth of GIS infrastructure did not change the status of mapping as separate from and subservient to politics.

As part of the chief's effort to create a more coherent GIS infrastructure throughout the UN, several new developments were implemented: For example, a "GIS Operation Manual, templates for resource planning, budget guidelines and missions have Standard Operating Procedures (SOPs) for GIS units," (Dorn 2007:40 Footnote 53). Also, the United Nations Geographic Information Group was founded in 2000 which was tasked with the coordination of GIS efforts between different UN offices and agencies, particularly with respect to data sharing and integration. Indeed, the GIS infrastructure was growing, "gradually evolving from *ad hoc* GIS arrangements to standardized structures and procedures," (Dorn 2007:40).

In 2004, the Cartographic Section moved again. Situated in the Office of Operations within the Situation Center, it moved to the Office of Mission Support. At the same time it merged with the Engineering Section which was still in charge of administering the GIS pilot projects. The overlap between mapping and technology there was already evident. Now housed within the Department of Peacekeeping

Operations (DPKO), the new Cartographic Section was explicitly responsible for mission support as well as supporting the Office of the Secretary General. This closeness to the political environment of DPKO however did not last long. In 2006, the Cartographic Section moved out of DPKO and was moved into the Department of Field Support within the Logistics Support Division and under the Specialist Support Services. This positioning of (GIS) mapping framed it as technical support work, thoroughly separate from politics. The journey of (GIS) mapping's institutional positioning render it firmly technical work.

This historical perspective from the mappers' point of view narrates GIS mapping practices as situated uneasily within the political practices that constitute Peace Operations. The constant moving of the Cartographic Section within the institution, particularly between public departments attest to what feels to them like an ambiguous identity. While the institutional status of mapping is somewhat unclear, its role in Peace Operations and demand for its use is expanding. This incongruence between being at once technical and implicated in the political project, while institutionally separated from it, is, as we shall see, what is at stake in mapping. It is a site of struggle and therefore politics. Bringing into congruence technology and politics, to achieve recognition of a co-constituted technological politics or political technology represents the contingency of GIS use in UN Peace Operations.

Institutionalizing the role of GIS

From a practice perspective order is never *a priori* but always the continuous outcome of production. As Law argues, there is always "order*ing* but there is certainly no order" (Law 1994:1). The organization of GIS mapping within the United Nations is thus a constant production process in which materials, doings and utterings

work together to produce effects that appear as order. It is in this process that the contingency of order becomes apparent. In the following, I draw on the rare amount of materials which seek to depict the role, rationale and set up of GIS as one in which the technology is subservient to and efficiently servicing its political clients. Continuing the thread from the previous section however, in which bringing politics and technology into congruence institutionally is what is at stake for mappers, problematizes this 'apparent' order. It shows that because of its institutional position which holds politics and technology separate constrains the proliferation of GIS use. In short, it illustrates the production of the relationship between politics and logistics and how this influences the organization of GIS at the UN. This section picks up on the last move of the Cartographic Section into the Department of Field Support (DFS) focusing on the evolving infrastructure as well as the associated conceptual development of GIS.

As stated above, the assumed possible benefits of GIS use were mentioned explicitly for the first time in the 2000 Brahimi Report. GIS had been used sporadically before. However, with this explicit statement the process of articulating a more focused effort to institutionalize GIS commenced. Although Dorn attributes this statement as decisive for the set up of the GIS field units, (Dorn 2007:39), the Cartographic Section chief argues that it was due to their concerted lobbying effort which facilitated the expansion of GIS (Steven, 23rd August 2011, New York). In Adler and Pouliot's terms, the "diffusion" (Adler and Pouliot 2011a:23) of GIS practice is thus dependent upon the advocacy of its proponents, in which they actively establish relations to make the argument for its utility. It required a conscious effort by mappers, as they state, 'to make themselves heard.'

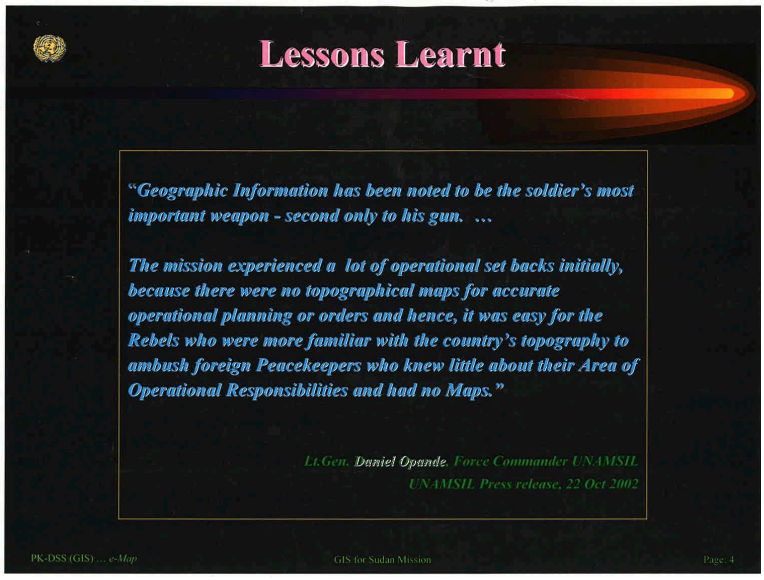
The argument for GIS utility follows that "knowledge of the Mission's terrain is extremely important during all phases of UN Peacekeeping Operations [including tasks such as] planning, budgeting, execution [and] liquidation," (UN DPKO Engineering Section, March 29th 2000). GIS maps can provide "the eyes" (Steven, 23rd August 2011, New York) of a mission, offering initial orientation and the knowledge to proceed with planning and implementation of mission projects. As the Cartographic Section put it, the deployment of Peacekeepers occurs "somewhere" (Steven, 23rd August 2011, New York). GIS can show what this somewhere looks like, revealing, for instance, demographic information, terrain and weather conditions. The technology translates the chaotic, foggy (post-)conflict space into a visualization of its usable information, thus providing the basis for spatial sense-making, planning and decision-making. The line of advocacy of GIS does not only seek to demonstrate the utility of GIS. It shows that missions and the spaces in which they operate are intrinsically intertwined. Peace missions always occur somewhere and GIS denaturalizes this spatial element and brings it to the fore.

As the following shows, making the case for GIS expansion is rooted in the negotiation of how GIS is understood. On the one hand mappers adopt the notion in which mapping serves the political: By trying to demonstrate their utility to the political through geographic information provision and map-production, they aim to expand their client base. On the other however, they contest this notion of the separation as it is fundamentally intersected by the epistemological fault. In other words, the separation maintains the hidden status of mapping thereby making it difficult for mappers to educate their clients on the politics of representation.

Making Logistics serve Politics

Prior to the set up of the piloting of the GIS Field Units, most missions neither had a systematic way of gathering, storing and maintaining geographic information (GI), nor were there any GIS personnel as part of mission deployment. From my interview participants' perspective, GIS use was scattered at best. When used, it was mostly by the military, who based on their training, are more accustomed to the use of maps and able to communicate with GIS officers in order to negotiate their GIS map needs. Moreover, most decision-makers within the substantive element of missions,[31] that is the political and civilian components, had no access to, and therefore did not use, geographic information. In the early 2000s the possible benefits of GIS for mission support became ever more clearly articulated within the UNCS but also via the field:

Fig. 11 UNAMISIL GIS Lessons Learnt Power Point slide



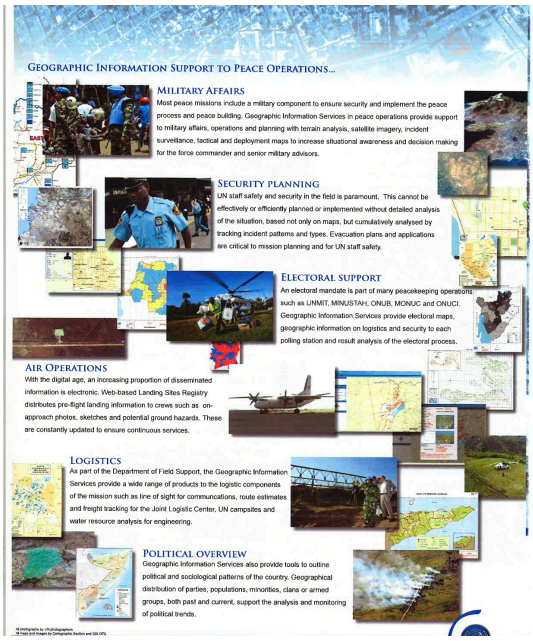
PowerPoint slide used in potential client workshops by the Cartographic Section in order to make the case for GIS. Source: I received it from the chief of the Cartographic Section, August 2011, New York.

[31] Peacekeeping missions consist of three elements: the military, the substantive which is the political and civil component and the support branch.

Here, a Force Commander of the Peacekeeping mission in Sierra Leone attests to the essential role GIS plays in the field, "only second to his gun." The recommendation was to set-up a UN Geographic Information System, a geographic information database as well as terrain analysis and GIS teams, (UNDPKO Engineering Section, March 29th 2000). As already mentioned above, the first GIS Field Units were established in 2001, with pilot projects in MONUC, UNMEE, and UNAMSIL (Dorn 2007:39–41). This represented the first clear effort to institutionalize GIS use within the missions gradually growing into " standardized structures and procedures," (Dorn 2007). The subservience of GIS mapping to politics as a smooth process is produced by the working together of a variety of documents outlining the current GIS mapping architecture.

Below depicts the pages of a brochure produced by the Cartographic Section used to outline its role in Peace Operations. In 2011 about 13 Peace missions had GIS unit attached to them in the field and GIS was institutionalized via the Cartographic Section and the GIS Center at UN Logistics Base. The images and headings demonstrate a picture of GIS pervasiveness, effectiveness and overall significance. The reader is provided with an advertisement showcasing the expansive utility of GIS in Peace Operations: it is involved in international boundary demarcation, operations planning, air operations, military affairs, security planning, electoral support, and services the Security Council with geographic information.

Fig. 12 UN Cartographic Section Brochure



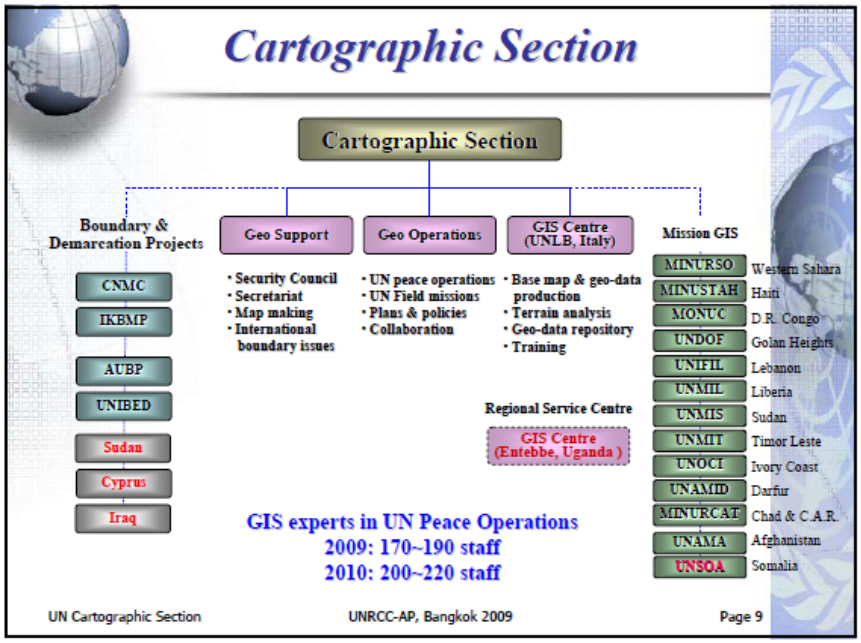
Brochure "United Nations Cartographic Section and Peace Operations Geographic Information Services." Source: I received it during my fieldwork in Dili, Timor-Leste from Chief of UN GIS Unit, November 2010.

This brochure created by the Cartographic Section fulfils the task of advertizing and demonstrating to potential clients its importance and

omnipresence. In another document, the Cartographic Section describes its mandate as "principle duties to provide accurate and timely geospatial information in support of decision-making and operational needs" (UNESC, August, 2009, E/CONF.99/IP.30). It caters to the Office of the Secretary General (UNSG), the Department of Political Affairs (DPA), Department of Peacekeeping Operations and the Department of Field Support (DFS). According to its chief, within the headquarters policy community, the Cartographic Section ought to represent the hub for any kind of geographical query and support (Steven, 23rd August 2011, New York). Its provision of geographical information ought to cover all types of UN missions, including peace-keeping, peace-building, political and humanitarian missions. For the Cartographic Section alone this represents a very broad mandate.

This diagram represents the official outline of the Cartographic Section and the work it ought to do (status of 2009):

Fig. 13 UN Cartographic Section Power Point slide

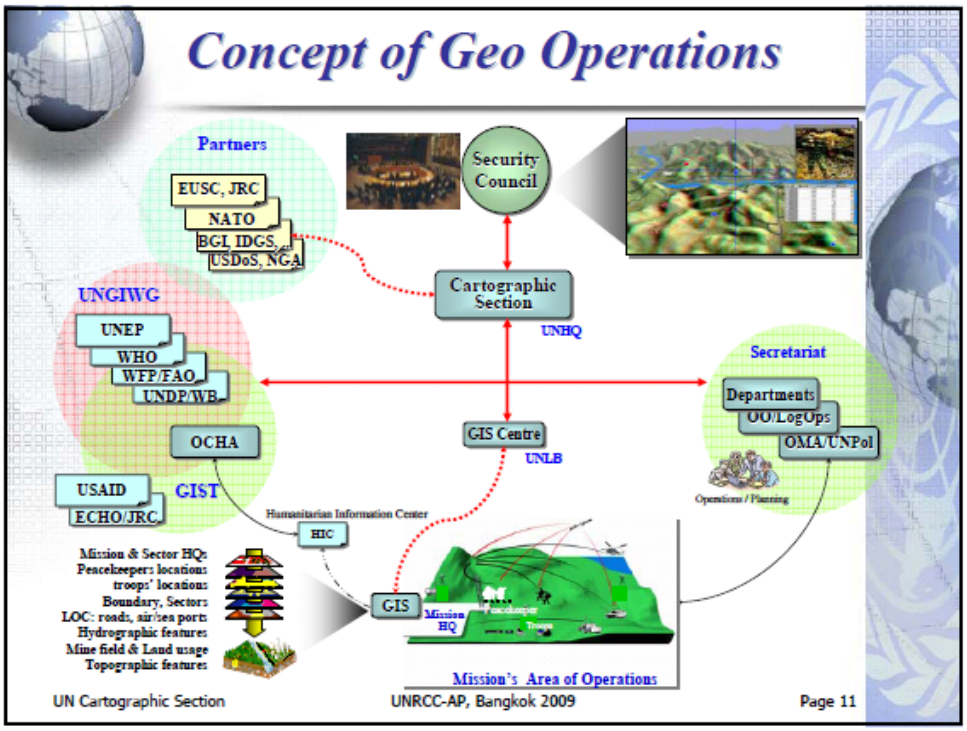


UN Cartographic Section *Geospatial Support for UN Operations*, Eighteenth UN Regional Cartographic Conference for Asia and the Pacific, Bangkok, October 2009, UN Doc. E/CONF.100/IP.20

We can see the three pillars already mentioned. The Cartographic Section fulfils the function of 'Geo Support', operates upwards, supporting the political departments of the Security Council (SC), the Secretariat, the Department of Peacekeeping Operations, the Department of Political Affairs (and Department of Field Support). It operates downwards, engaging with the units in the field. The Cartographic Section set up the GIS Center at the UN Logistics Base in Brindisi, Italy in 2007. Although, the Cartographic Section "communicates [with] and supports" GIS units in the individual field missions, (UNESC, October 2009, E/CONF.100/IP.20), the UN Logistics Base GIS Center provides a more direct support base for field missions, in terms of technical support and training. Its main on-going task is to produce and provide topographical base maps for particular mission areas while also undertaking "on the timely basis mapping projects, terrain analysis, ground water assessments and other important tasks," (UNESC, August, 2009, E/CONF.99/IP.30). The Center also offers training to mission personnel in order to build and enhance GIS capacity as well as direct IT support.

Let's take a look at the concept of Geo-Operations organizing GIS use:

Fig. 14 UN Cartographic Section Power Point slide



UN Cartographic Section *Geospatial Support for UN Operations*, Eighteenth UN Regional Cartographic Conference for Asia and the Pacific, Bangkok, October 2009, UN Doc. E/CONF.100/IP.20

Again, this diagram gives the impression of an elaborate, sophisticated and well co-ordinated GIS infrastructure. Here, we can see the downwards operations of the Cartographic Section as well as all the other departments, agencies and partners involved in GIS mapping. The mission area on the bottom of the diagram literally represents the mapped field upon which policy is then developed and implemented. The left hand side represents the scientific community, agencies involved in mapping and the production of spatial knowledge. The Geographic Information Working Group (UNGIWIG) as well as the Geographic Information Support Team (GIST) are constituted by members of these listed agencies which are directly

concerned with mapping and geographic information. On the right side, we see the political client community as represented by the Secretariat, the Department of Peacekeeping Operations and the Department of Political Affairs.

Although the concepts of Geo Support and Geo Operations are separate in their definition of tasks, as we can already see, they overlap in practice. What is going on in the field of course impacts at times the support given to the political departments. The work of the GIS Units in the field, are directly sub-ordinate to the field mission and thus respond directly to the needs of UN mission staff, both military and civilian (UN Vacancy Description, 2007).[32] The units themselves are often made up of personnel trained in GIS with either civilian, civilian police or military backgrounds. Their main focus is on the preparation, maintenance and provision of geographic information relating to the mission objectives (UN Vacancy description, 2007; UN Vacancy Description, 2005). More precisely then GIS Unit personnel are responsible for data collection, storage, modelling, analysis and visualization.

Three insights can be gleaned from these documents: They function as advertizements, educating political clients on the presence and organization of GIS. They demonstrate the close relationship between the technology and politics, i.e. its political utility. And finally they project a functioning hierarchy in which GIS efficiently services the political. In light of the picture painted from the field experience of non-use and disorganization in the first empirical chapter, this assemblage of documents and statements must be read not as a depiction and explanation of GIS architecture but as a sort of sales

[32] These are UN GIS specialist job advertisements setting out job descriptions, available online, accessed 12th July 2010.

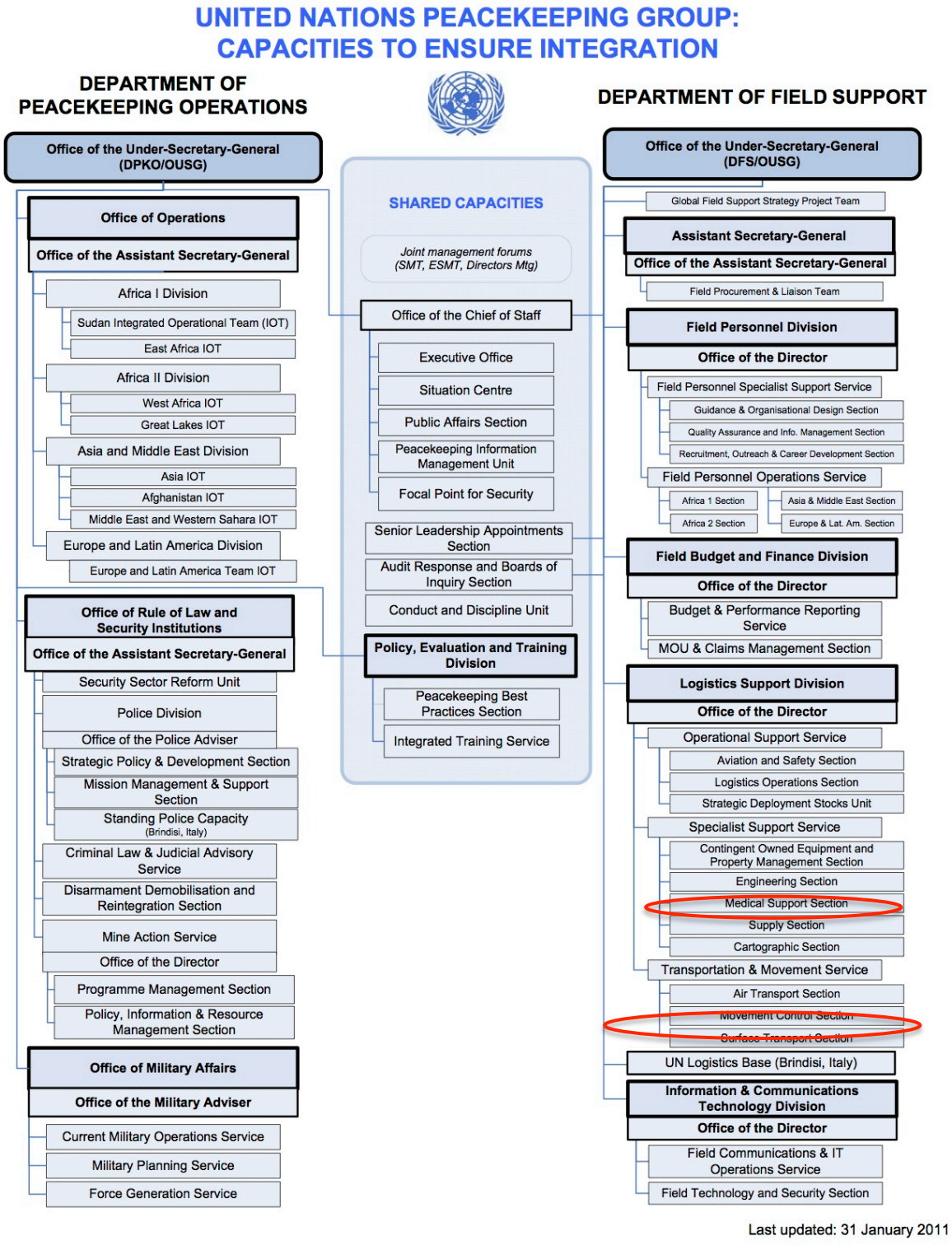
promotion. It is important to be clear here: Mappers use these documents to demonstrate an architecture which efficiently serves the political. They do so in order to make stakeholders aware of mapping and thus to expand their client base. While they reject the separation of politics and logistics conceptually, they use it in order to make the current structure work for them. This is part of their practice.

Contesting the Separation

I discussed these promotional documents with GIS practitioners in interviews outlining the impression they give of a GIS as coordinated, integrated and ubiquitous technology. One of the responses was: "That is unfortunately not the case" (Max, 28th August 2011, New York). Despite the portrayed structured arrangement, they state that their GIS client list is short and overall use is still low. The institutional location of GIS influences the extent to which it is used and understood. The separation of mapping as logistics from politics at the same time maintains the epistemological fault and limits 'competent' use.

The 2007 move of the Cartographic Section from the Department of Peacekeeping Operations (DPKO) – a 'political' department – into the Department of Field Support (DFS) under the Logistics Support Division and the Specialist Support Services (see organogram below) played an important role according to Cartographic Section staff (Max, 28th August 2011, New York). Whereas previously, the Cartographic Section was housed within the Department of Peacekeeping Operations and thus 'closer' to the political community and hence decision-makers and potential clients it ought to serve, it is now situated clearly and deeply within a supporting and logistically oriented framework.

Fig. 15 United Nations Peacekeeping Group Organogram



Source: available at http://www.un.org/en/peacekeeping/documents/dpkodfs_org_chart.pdf, accessed 2nd November 2012

In this diagram politics is displayed on in the left column and logistics in the right hand column. Peace Operations as politics consists of area and regional offices, legal, and security offices, policy and military affairs. On the other side, Field Support provides the services which make possible the building of worlds as strategically envisioned by the left column. Thinking back to the definitions of logistics given in the introduction, for example as "all activities in war that are pre-conditional to the use of the fighting force. It is the condition of possibility for the conduct of war" (Proença and Duarte 2005:645 – 646), logistics is seens as completely instrumental and utilitarian. Translated, GIS here is part of logistics of Peace Operations, i.e. that which makes it possible. Yet, paying close attention to 'that which makes it possible', to 'the condition of possiblity' demonstrates that logistics is not simply available to be drawn on to operationalize. Its meaning is at stake. It is a sight of struggle.

Framing the conditions of possibility of GIS not just in terms of the 'conduct' of Peace Operations, i.e. how to execute and implement, but in terms of the envisioning itself, i.e. what is possible to envision, demonstrates the co-constitution of space and politics. It is interesting to compare this organogram with the statement on GIS in the Brahimi Report and the Cartographic Section brochure. Given that these documents ascribe a revolutionary potential to GIS for strategic planning, it is quite a task to even find the Cartographic Section on the right hand side of the organogram (highlighted by the red circle). The GIS Center is not even visible since it is only one part of the UN Logistics Base (second circle). Buried deep within the Department of Field Support, as the diagram shows, renders mapping as merely one aspect of what is an extensive support effort.

As Max states,

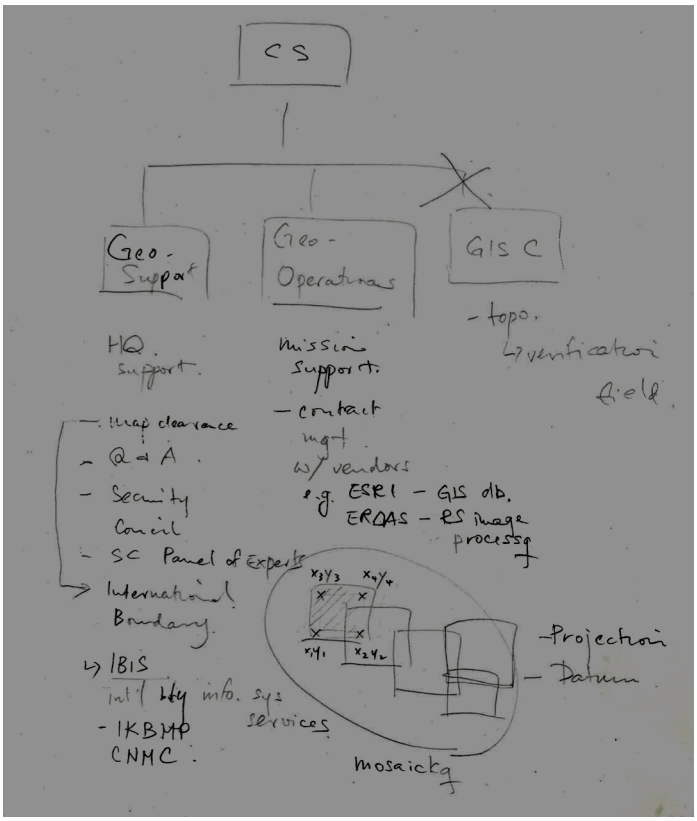
> "I think we are buried too deep into logistics to really use the full potential of what we could do [...] historically GIS function in the mission is an engineering function. And then we got out of engineering but we are still at the heart of support, the logistic component. I mean we are here. And we don't really belong here," (Max, 28th August 2011, New York).

Interviewees state that not only are they in the "wrong department" but the specificity of what they do is not recognized. This institutional location puts the Cartographic Section in a difficult position with regard to accessing and gaining new clients. In fact, as Cartographic Section staff noted, official protocol requires that prospective clients go through the hierarchy of the Department of Field Support in order to reach the Cartographic Section. And vice versa the Cartographic Section has to justify all its projects to the director of the Department of Field Support. Looking back at the organogram, we can see all the layers of authority which have to be negotiated. Thus, the separation of logistics from politics as the two pillars in the organogram illustrate, also maintains the epistemological fault. It makes it difficult to establish opportunities for mappers to educate political stakeholders on the intertwinement of the map and politics and the politics of representation.

Moreover, the epistemological fault influences the organization of mapping not only in relation to their prospective political clients but also in terms of their own 'community of practice'. Below is a map drawn by a member of the Cartographic Section. It was drawn during an interview in which she explained to me the organization of GIS. The three pillars below the Cartographic Section look familiar, reiterating the concepts of Geo Support and Geo Operations and the GIS Center. However, the connection between the Cartographic

Section and the GIS Center is crossed out. The latter has quite literally been cut off from the former.

Fig. 16 Map of Geospatial Operations



Drawn by Nicole explaining the organizational set up of the Cartographic Section's work, 30th August 2011, New York

As part of the streamlining of support services under the "Global Field Support Strategy" (UN Secretary-General 2010), the GIS Center was moved out from under the command of the Cartographic Section and now reports directly to the UN Logistics Base. Referring back to the organogram, one can see that the UN Logistics Base is situated within the Logistics Support Division, yet completely separate from the Cartographic Section. The chief of the GIS Field Unit in Dili explained the infrastructure to me as follows: the Cartographic Section does the policy and strategy stuff and the GIS Center does the mission operations (Michael, 22nd November 2010, Dili). Separating them institutionally in this way underwrites further that

the way in which mapping is understood influences the way in which it is organized.

For example, as Max points out, before the move out from under the Cartographic Section, "I reported directly to chief of Cartographic Section. [Then] instead of talking to him twice a day I spoke to him twice a week. I was talking to someone else and this person was not a GIS person, totally unaware of GIS" (Max, 28th August 2011, New York). "It is tough to educate the person and convince them about the direction you want to go and why you should be doing that project and not that one," (Max, 28th August 2011, New York). He explains the implications further:

> "When you are in mission you have the GIS worst case scenario which is under an engineering section and the integrated support services which is under the director of mission support who belongs to the deputy SRSG [Special Representative of the Secretary-General], you have to talk to the other deputy SRSG, the Humanitarian coordinator. You can talk with them but does that raise enough awareness? And therefore when [you] get back to your management requesting budgets, resources to improve your operations to do more, if you don't have this awareness you generally fail to get more resources" (Max, 28th August 2011, New York)

The unawareness of the specificity of mapping leads to a constraining of the mappers' agency and the work they can do. The infrastructural set up makes communication, coordination and funding difficult as the three sites, the Cartographic Section, the GIS Center and the field units are officially not really connected. The GIS field units report to their immediate missions while the GIS Center ought to provide support for them who themselves report to the Logistics Base. The Cartographic Section ought to take the leading role in terms of policy and strategic planning regarding GIS use, and yet is buried too deep in a Logistics Department. Furthermore, in all three instances the mapping sites are subordinate to a UN entity which does not do

mapping: either, the mission, the Logistics Base or the Logistics Support Division. Thus, those who are superior to them, although they are placed in support services, do not necessarily understand what GIS specialists do. Some of them, as Max states, are completely unaware, (28th August 2011, New York).

This demonstrates how the institutional separations, on the one hand between politics and logistics, and between mapping sites within logistics on the other, is bound up in 'unawareness' of GIS specificity. This means that the use of GIS and thus the politics of its use are clearly implicated in its institutional situation. This institutional situation is conditioned by how mapping is understood and the extent to which this understanding is shared: as separate from politics, or as constitutive.

That these separations have effects on GIS use can further be substantiated by looking at GIS funding and budgets. If we take the advocacy for GIS in the Brahimi Report and the revolutionary potential GIS is said to represent, then it seems pertinent to know what is spent on it. Has there been an overall increase in spend? If yes how much? Dorn argues that the set-up and maintenance of a "professional GIS service can be substantial", (Dorn 2007:41). Referencing the Resource Planning and Budget Guidelines for GIS in Peacekeeping Missions, he states that

> "the GIS start-up package (including personnel) is of the order of $500,000. During operations, satellite imagery costs are typically: $300 per scene (low resolution); $1,000 per site (100 km2, medium resolution, e.g. from SPOT), and $2,500 per site (100km2, high resolution, e.g. from Radarsat or Quickbird)," (Dorn 2007:41).

Although, we get an idea of the itemized costs of GIS use, we do not get an insight into what is actually spent on GIS. A staff member of the GIS Center states that the topographic map projects for mission

in Darfur and in the Democratic Republic of the Congo, they manage at the GIS Center cost $500,000 and $100,000 respectively, (John, 16th November 2011, Brindisi).

Looking through the UN General Budgets from 1996 to 2011 and the UN Peacekeeping General Budgets from 2000 to 2010, it seemed almost impossible to find figures on actual spend. The reasons for this are institutional: First, the moving around of the Cartographic Section within the institution makes it difficult to trace its budget allocation. Although it sometimes appears on the budget form, its actual allocation is always usurped by another Service or Division. Second, and more importantly, it is this kind of hidden integration of GIS-use which means that there is often no explicit allocation of funds to GIS activities. In the mission for example, the field unit's activities are integrated in the budget mission. The GIS Center is integrated in the Logistics Base and the Cartographic Section in Specialist Support Services. This further underlines the disjointed set-up of mapping in the UN and the contested and somewhat obscure position of GIS mapping within UN hidden in the shadows. Therefore, the potential benefits inscribed into GIS use as articulated in the Brahimi Report are circumscribed by a) the separation of logistics from politics which is b) mediated by the epistemological fault.

Accounting for the role of 'shared understanding' in capturing the meaning and organizational working of technology is not always present in the literature. Consider Lejano's example: in his piece 'Technology and Institutions' specifically focuses on the increasing use of GIS in the 'planning domain.' Also adopting a practice perspective he aims to "assess how its use enables, enhances, or deters from effective planning" using the case study of "collaborative research initiative by the community group Communities for a Better

Environment, in southeast Los Angeles" (Lejano 2008). His points of contention very much proceed along the lines of previous GIS critiques, rendering GIS use as reductionist and rationalist, alienating to the real while privileging the problem-solving capacity of the digital. While, as with the previous critical literature, his points are merited, his practice approach is lacking in that it is distant from those who map. One does not find their points of views. Instead, they are just plain executioners of the assumptions assumed so inherent in the technology. His practice approach is still one deployed from a distance in which mappers "learn to separate time, motion, and phenomenon from place, forgetting that land use is all about movement and process," (Lejano 2008:673). Yet, it is precisely the extent to which the nature of GIS, indeed the politics of representation is understood, by whom and how much it is shared. This provides a different, more dynamic and complicated analysis of the meaning and working of GIS in an institutional context. It is also demonstrates that the politics of logistics is not merely defined by its master categories through which it shapes the world but on how these are understood and used.

While in his example the position of planner and mapper seems to be occupied by the same person, they are simply assumed unaware of GIS politics. They are subsumed into the politics of the technology and are rendered without agency. In the case of UN GIS use the separation between those who map and those who do not clearly matters as it highlights the differentiation of understanding. Taking in the narratives and perspectives of the mapper demonstrates that GIS use is under-used by non-mappers and not very well understood. It is rendered secondary to politics. Its specificity is not acknowledged having led to separations within the mapping community itself. From a practice perspective, the agency of mappers is taken seriously in the production of order. This moreover demonstrates that there is

heterogeneity in perspectives within Peace Operations. There is a struggle over what is constituted as political, what categories ought to be used and how they should be talked about it. This is a site of struggle. The following section highlights how they negotiate this environment of separations.

The Epistemological Fault and its Contingency

According to Adler and Pouliot, "the politics of practice concern the ways in which agents struggle to endow certain practices with political validity and legitimacy" (Adler and Pouliot 2011a:21). This endowment happens through negotiation, the outcome of which is not settled. And it is through these struggles "new fields of possibility" come into being (Turner 2007:115). Thus, practice is "eminently political in that it sustains, or undermines, existing patterns of power relations" (Adler and Pouliot 2011a:21). These separations although inscribed into documents and present in physical locations are either sustained or undermined in practice. The privileging of politics over logistics is not set in stone. And neither is the low awareness of GIS specificity across the organization. Mappers do indeed 'struggle' to achieve recognition of the co-constitution of GIS as political *and* technological. They struggle for this claim to be endowed with 'political validity.'

The politics of practice is constituted by something at issue, at stake in their outcome (Rouse 2007:531–2). It relates to the production of agency, the production of what it means to map, emergent in the production of the organization of mapping. Rouse argues that power is not a "substantive capacity within the world (distinct from force or violence); instead it expresses how one action affects the situation in which other actions occur, so as to reconfigure what is at issue and at stake for the relevant actors" (Rouse 2007:532). For Adler and Pouliot practices in this sense are shot through with power (2011a).

There is an interplay between sustaining the separation or undermining it. And it is in the process of undermining that what GIS is and what it means become subject of discussion. That realm of deliberation recasts the map's politics of representation into a post-representational frame. The proliferation of understanding GIS as a specific technology which has effects in the world requires just that – understanding it.

This section examines the role of GIS specialists in the production of this order. It opens up how they struggle to gain a voice, making themselves heard, and overcome the obstacles presented to them in their everyday within the United Nations. In asserting their agency, they argue: "we keep trying to build the case […] I guess it is our burden. We have to carry it and make sure that we do better," (Max, 28th August 2011, New York). Opening up the map as practice, allows taking into account the creative ways in which mappers exercise their way of being. Focusing on their accounts shows that despite the institutional separation, the ties of what they do within a community of practice still matters: they are a) still connected to one another, sharing in what it means to be a GIS practitioner at the United Nations. And b) they join together in breaking out of their isolation, to make themselves visible and heard, attracting new clients. As Bueger states, "structure needs to be activated in practices" and "leads to a fairly contingent understanding of order" (Bueger 2011b:174). The epistemological fault in its separation of politics and logistics is always at stake in the production of order. It is contingent.

The Cartographic Section and GIS Center staff represent a community, or a "community of practice" in Wenger's terms (1999). Connected by what they do, particularly, by having a practical understanding of their institutional location and identity, they stand in relation to one another. For example, as mentioned previously, all

sites report to a superior UN entity either political or support. And these entities do not map in their everyday. Their tasks are different from the everyday practices of mapping. As one member of staff stated, they even have to explain their projects and associated rationales to the Director of Logistics (Lutz, 13th September 2011, New York) within support services. In the mission the picture is the same:

> "When we talk about a mission like MONUC, we are talking about basically 22,000 people. That is a lot of people. And it means that the head of mission is quite far away from you both geographically [in Kinshasa] but also in terms of hierarchy. Let's say the SRSG's [Special Representative of the Secretary-General] main job is to focus on political aspects of the mission and he generally has one or two deputies – one focusing more on humanitarian and the other is the big boss of the support component and coordinating all those activities. These are big guys; you don't knock on their door easily. Either they are sufficiently interested in and know they have a GIS component, sometimes they don't even know they have a GIS component in their own mission," (Max, 28th August 2011, New York).

Yet, in spite of the institutional separations, and this culture of low awareness, the sharing of their understanding represents a common goal and tightens the fabric of their own community. Because of their specialization in GIS mapping many have moved around the different mapping sites. Nicole has worked in several Field Units; Max has worked at the Center; and they all still meet at trainings. Not only do they have a shared understanding of what it means to map; they have a shared understanding of what it means to be a mapper in this institutional environment, facing the same obstacles. Staff members at the Cartographic Section and the GIS Center have described themselves as "a family," (Steven, 23rd August 2011, New York). As a community they share job advertisements and exchange experiences. The chief of the Cartographic Section stated that he understands it to be his responsibility to ensure the professional welfare of GIS

specialists (Ibid.). This connectedness shows how the institutional structure which separates them internally is being undermined by a shared mode of understanding.

In light of their external separation from the political, manifested in the epistemological fault, the mappers have the task to make themselves heard and understood in order to fulfil their mandate, gain new clients and advocate for the maximization of GIS potential across the institution. Despite the Brahimi Report's claim of GIS as useful tool for policy and project development and strategic problem-solving, mappers are concerned with how little UN personnel are either aware of the technology's existence or their lack of understanding the nature of its capacity. Speaking to the UN Geographic Information Working Group, Canada's Ambassador to the United Nations addressed this imbalance between promise and use:

> "you are capable of producing magnificent products.... You must be more forceful in forcing them down the throats of users, who, for all kinds of complex reasons, do not want to have anything to do with your products" (quoted by Keeley 2003).

This stands in stark contrast to the more accepted notion that science underwriting governance issues holds legitimacy in and of itself; as scientific practice "they arouse legitimacy and respect, and thus superiority over other forms of knowledge" (Abram 2005:10).

GIS practitioners from the Cartographic Section and the GIS Center engage in a variety of lobbying activities, in order to navigate these institutional challenges. As the chief of the Cartographic Section in New York put it, the GIS team supports the political agencies by introducing and educating them about the use and utility of GIS, to persuade them of its advantages and the benefits (Steven, 23rd August 2011, New York). In fact, it really requires "us to speak up with [our] voice" (Steven, 23rd August 2011, New York). At the GIS

Center too, as Scott states, "our task to make ourselves known" to create a "meaningful framework for mission support" (13th November 2011, Brindisi). This lobbying requires an effort to "constantly educate people" to combat the problem of awareness. This is particularly necessary for those people in decision-making positions, as Lutz states, who do not seem to use maps in their work very much (Lutz, 13th September 2011, New York).

Although the institutional set-up constrains the lobbying effort, the mappers often rely on what they call the "working level approach" (Steven, 23rd August 2011, New York). Once contact is established, that is once a "working business relationship" exits, then "there is a network of how to get in touch," (Steven, 23rd August 2011, New York). The Department of Peacekeeping Operations, particularly because of its close history with the Cartographic Section, but also the Department Political Affairs can be lobbied more directly as they have been working together in the past. In these ways, they reach out to current and prospective clients to set up meetings, to explain themselves, and to advertise their services. The Cartographic Section for example has in the past invited the Department of Political Affairs to showcase the advantages of GIS for organizing elections, to demonstrate how it can visualize mediation, organize genocide evidence, produce maps for safety and security, or be useful for boundary delineation and demarcation (Steven, 23rd August 2011, New York). In the field, they try to demonstrate their utility by "supporting the electoral process whether it is Congo, Haiti, Cote d'Ivoir, and to a lesser extent Afghanistan." They always look for "an entry point that is interesting," (Max, 28th August 2011, New York). They also hold seminars and workshops not just for political agencies but also for the Office of Military Affairs (Lutz, 13th September 2011, New York).

However, this multi-pronged approach is not only one for fulfilling its mandate, it is also a battle for survival. The Cartographic Section has to constantly argue and lobby for a place in the field, argues one interviewee (Lutz, 13th September 2011, New York). The GIS Field Units were a product of a concerted effort to make the case for the utility of GIS. However, as stated above, not all UN missions have GIS Units and some only have a couple of members of staff. When I was in Dili, there were only five members of staff in UNMIT's GIS Unit. As I tried to arrange my field visit to the GIS Center in Brindisi, one of the conversations focused on the concern of whether there would even be enough resources available to them in the next fiscal year. Projects might be scrapped or their mandate curtailed. Aiming to attain 'political validity' and 'legitimacy' is thus couched within struggle for survival.

It is partly due to their lobbying efforts that demand for their products and services are increasing. As Lutz says, more people within the organization are beginning to ask for maps, so overall it may just be a question of time. This year alone (2011), they had significantly more requests for satellite imagery, (Lutz, 13th September 2011, New York). Yet, as the mappers were talking about their lobbying practices in order to overcome and contest their isolated situation, they mentioned other factors which are too mediated by the epistemological fault: For example, the financial costs of GIS, the high staff-turn over, the generational aspect in terms of knowledge of GIS and leadership.

GIS is not cheap. As pointed out earlier, while there are estimations on GIS unit costs, it is difficult to identify allocated budgets and actual spend of the particular sites. As one GIS practitioner argues, if people already have difficulty understanding what GIS might do to help their work, they are unlikely to 'buy' into it. In this

sense, justification to non-GIS people in regard to costs is sometimes difficult. There is a greater focus on the "substantive" (Eva, 15th September, 2011, New York). The "substantive," that is the political elements of the mission are prioritized, and seen as separate from support services. They are only insofar necessary as they aid in emphasizing the political. The epistemological fault influences resource allocation distribution.

Moreover, the high frequency of staff turnover across the United Nations makes it difficult for mappers to undermine their institutional position and to enact the structure differently. "Lobbying is hard work and continuous," (Nicole, 30th August, 2011, New York). As one GIS practitioner recounts from his experience with the GIS unit in MONUSCO: "As soon as you educated some, they left; it was difficult to find people who were interested" (Nick, 14th November 2011, Brindisi). He further states that as a consequence you can get quite frustrated with trying to educate people over an over again (Ibid.). Although the argument is that it may just take some time for people to grasp GIS (Steven, 23rd August 2011, New York), the turnover renders it difficult to achieve consistent recognition of their legitimacy and political validity.

The generational turnover however might aid the lobbying process; as one GIS specialist argues: in the process of constant lobbying it seems helpful if the counterparts are younger, as they often have a closer relationship with technology (Tim, 26th August 2011 New York). There definitely is a generation issue present, states Nicole, now suddenly there is a surge in demand but we need to continue to slowly persuade the rest (Nicole, 30th August 2011, New York). Most other members have had GIS training as part of their initial education. Yet, the older generation in the political decision-making echelons are more difficult to persuade. This notion again reflects the

normalization of the cartographic imagination. As Steven argues, leadership or rather decision-makers do not only seem not to use maps often but generally do not rely on data collection in the same way (Steven, 23rd August 2011, New York). This echos the comments from practitioners in Dili as well as other scholars' judgement that the "UN [has a] habitual 'allergy' to 'intelligence'" (Keeley 2003). Younger members of the political community seem to understand the importance of spatial knowledge in its technological GIS couching more easily than some of the more resistant older decision-makers.

Finally, the human element is important (Eva, 15th September, 2011, New York) for two reasons: On the one hand, leadership is central to establishing good working relationships with clients. On the other, the epistemological fault does not neatly organize mappers and non-mappers. Some non-mappers do share the understanding that the map is political and thus, that politics cannot be completely separated from logistics. For example, the success of a GIS unit attached to a field mission, so it has been argued, is highly dependent on the personal and networking skills of the unit's GIS chief. It is down to him to make connections, identify partners and new clients (James, 25th August, 2011). In this sense, the GIS unit can do and support everything in theory but it is the chief which must facilitate its growth.

The human element then encapsulates the harvesting of personal relationships and the pursuit of networking (Tim, 26th August 2011, New York). And of course, if the client either already shares the understanding or is very receptive to gaining this kind of knowledge, this improves the conditions for traversing the epistemological fault. As a consequence, it allows for the creation of new fields of possibility or for mappers to enact structure differently. It is the GIS mapper in the interaction with his/her counterparts which renders GIS

organization, role and use contingent. Importantly however, this means that an analysis of the role of GIS in this context must acknowledge that mapping includes these activities. While seeking recognition, they have to maintain their profile and produce their products with limited staff and budget resources. The production of the structure which organizes GIS mapping is thus central to everyday mapping work and mediated by the epistemological fault.

The activation or enacting differently of orders is at times bound up in what Reckwitz calls "motivational knowledge" (Reckwitz 2002:249). Sharing in knowing the specificity of GIS and thus having an understanding of its possibilities, represents practitioners' motivational knowledge: it is their belief in the potential of GIS and the contribution they could make through their work. It represents the traversing of the epistemological divide. As Scott states, we could do so much more for political missions and the humanitarian sector (13th November 2011, Brindisi). They hope to further raise general awareness about the utility of GIS and its capacity to support a range of tasks in peace-keeping but also for peace-building, humanitarian and disaster and risk management. The time since its inception is regarded by GIS practitioners as an improvement journey:

> "But if you look at where we have come from as a group, we are quite a young program in Peacekeeping and 10 years ago there was not so much of us, we were not part of the picture, we had to fight to make sure we would and so there has been some quite big progress" (Max, 28th August 2011, New York).

The organization, role and use of GIS is thus contingent upon the ability for GIS practitioners to make themselves heard, maintain and attract clients and to explain the technology's specificity (as set out in the previous chapter).

Conclusion

A practice perspective frames the United Nations as organization representing an assemblage of network relations. These are however neither random nor structurally static. This chapter has demonstrated that the negotiation of the understanding of logistics as separate from and subservient to politics organizes GIS mapping at the United Nations. This field does not determine their practice; rather the practice constitutes the field. Here the history of mapping, the institutional set up and mandates are at once constituted by artefacts inscribing and projecting a coherent UN GIS project *and* practitioners' experience and everyday work attesting to their marginalization and struggling for political validity and legitimacy. Order is always contingent upon its production. Mappers partake in producing and contesting these understandings. Organizations are an instantiation of practice. And practice reframes the question of a) whether and how GIS promotes greater efficiency and coordination in UN Peace Operations and b) where the political effects of Peace Operations are to be rooted.

The history of mapping, as told by practitioners, produces a narrative of continuous displacement. On the one hand, maps as images are so normalized that their production can be placed in a publication department. This normalization echoes the findings from Timor-Leste. On the other, some maps as artefacts are too sensitive to be shared. However, how to assess in which category a map falls is not an inscribed process. Maps are political but their politics is not understood. Maps are an afterthought to the extent that some should 'maybe be classified,' but how, and on what basis, would require a collaborative response between mapmakers and their clients. The understanding is therefore not shared. Moreover, while demand over time increased, the recognition of mapping as political technology was

not attained and their institutional situation remained largely unchanged. For mappers this tenuous dichotomy is at the forefront of how they feel their work is being understood and thus organized within the United Nations. The ambiguous status of mapping and its placements in isolated departments as a seeming afterthought represents a sort of habitus for mappers. It functions as a rationale governing the way in which they narrate the organizational role of mapping.

This produces a production of order in which on the one hand through artefacts mappers seek to portray a coherent and expansive architecture while on the other they seek to overcome their marginal position by maintaining their 'community of practice' and lobbying for new clients. From mandate descriptions, to brochures outlining GIS's role in Peace Operations, to PowerPoint presentations attesting to the technology's utility in the field, an arrangement of documents work together to portray GIS as vital and its integration as efficient and functional. Yet, this arrangement is pervaded by what I have called previously the habitus of mappers. It includes the experience of being misunderstood and marginalized, and that their work is implicated in politics remains unacknowledged. Externally separated from their clients, hidden in logistics, usurped as mere technology, and internally separated from other mapping sites, mapping is portrayed as continuously marginalized. As a consequence, mappers argue that due to its organization, GIS is not used as much as one would expect given its advertisements; it is not known about, underestimated or misunderstood, underfunded and understaffed.

The production of order is then an interplay between mappers, their clients and logistics colleagues, and the different knowledge sets and understandings they bring to bear on mapping. On the one hand, the institutional set up is sustained by the separation of politics and

technology and the disregard for the specificity of GIS. On the other, it is undermined by a) GIS practitioners maintaining the links between one another, irrespective of structure of command; and b) reaching out to current and prospective clients in order to traverse the epistemological fault.

While the chapter provided a heretofore unknown overview of mapping sites at the UN in the context of Peace Operations, it crucially argued that the organization of GIS, and thus its use, is contingent on the understanding of GIS. The agency of mappers is important to the production of order. Rather than mere henchmen in an almost conspiratorial framing, we can see how they engage in a struggle to create an order in which they are 'politically valid' and 'legitimate.' Rather than mapping as tool of a hegemonic machinery, the use of GIS and its role is dependent upon a revision of an order in which it is underused and largely unknown about. Indeed, this perspective allows to differentiate between different actors and understandings constituting UN Peace Operations. The epistemological fault organizes and mediates the use of GIS in UN Peace Operations.

Yet, it does not have a structural quality in that it does not determine use and meaning of GIS. Instead it represents the terrain of negotiation and translation. Mappers amongst one another, with their clients and in the interaction with the technology and the institution of the United Nations, affirm and contest this fault. At times the fault is traversed and re-organizes the spread of how mapping is understood. And at this point we have to ask again so what does it mean to have mappers struggle for political validity and for legitimacy within the UN? What impact does it have on Peace Operations? Mappers raising their profile through awareness workshops and gaining more clients will proliferate map-use within the organization.

The map as Kitchin and Dodge conceptualize it, is always open to interpretation, every single time anew; every encounter with the map somehow creates new spaces. This chimes with the always simultaneous existing possibilities of ethical use by being sensitive to local realities and of instrumentaly use by being goal oriented, I had outlined in the previous chapter. It is not merely about the data categories as Lezcynski has highlighted but about how these are understood and the kind of conversations these invoke. At this point the relationship between politics and logistics is not settled. Logistics is a site of struggle. Struggle requires interaction and negotiation. The epistemological fault helps to explain the terrain of the struggle within which lies possibility. The impact of GIS-use on Peace Operations is not settled. And from a practice perspective it would not be as it always searches for the contingent spaces where difference is possible. This investigation has found contingent spaces, in which reflective conversations took place.

7 Conclusion:

This concluding chapter summarizes and synthesizes the forgone practice investigation of GIS use in UN Peace Operations. It surveys the purchase of the epistemological fault as a concept to illustrate use and highlight contingency. This synthesis is organized around the two dimensions of the fault: the politics of representation and the separation of politics and logistics. In the second part, the chapter reflects on the research process, specifically on the challenging logistics of this project, touching on issues such as access and security. As part of this discussion, I also emphasize the important contributions an inter-disciplinary practice methodology can make in this context and the work it does to address these challenges. Finally, the chapter articulates the project's broader contributions in two ways, thereby outlining fruitful directions of future research. On the one hand, it sketches out the implications of taking seriously the role maps play in the constitution of political imaginaries and the effects these have in the world. On the other, it concludes with picking up Sørensen's ask to engage with technology constructively and critically. Thinking politics and technology together also recasts the way in which we conceive of the relationship between politics and logistics.

The Contingent Politics of GIS use in UN Peace Operations

The literature review on Peace Operations exhibited a somewhat binary assessment of mission rationale and practice: On the one hand, the Liberal Peace as a guiding framework for Peace Operations has been termed necessarily progressive, representing the apex of political evolution and its shortcomings are a mere problem of overall coordination, resourcing and commitment. On the other, it has also

been coined neo-colonial and oppressive excluding the local and operating only in the interest of a few select members of the international community. Rethinking Peace Operations must consequently include questioning its universalist assumptions, accounting for local conceptions of peace, agency and resistance in order to facilitate locally sustainable peace.

While this review is admittedly schematic – I have pointed to other important existing work which blurs this binary spefically focusing on hybrid practices – it is still instructive for this project as it is mirrored in the discourse surrounding GIS and cartography. The politics of GIS is necessarily progressive as it represents the cutting edge of computer-powered cartography. Its ability to make the world ever more knowable renders it a tool of scientific advancement. On the other hand, as a technology and artefact, GIS maps are implicated in the politics of representation always situated in specific power/knowledge constellations which influence what is inscribed and what is written out. Underwritten by a specific Western understanding of time and space, producing particular representations of the world has effects in the world. Maps have played a role in colonial empire-making, war and post-conflict pacification. Critical responses too have highlighted these universalist assumptions and have worked to produce resistant GIS, with the view to enable emancipation and democratization.

While this thesis has not jettisoned the value of these discourses, it offered a very different starting point. Instead of analyzing the politics of GIS in Peace Operations by merging and comparing the discourses present in the literatures, it sought to problematize and enrich these narratives with a perspective from the field. It submerged itself into the mapping world. Beginning in Timor-Leste, investigating and following maps, mappers, and their projects, I discovered the field.

The GIS Center at the UN Logistics Base in Brindisi and the Cartographic Section in New York had thus far not been visited by a researcher. This world, the world of GIS practitioners, had thus far been lying in the shadows. Mappers, silenced in the literature on maps, have been rendered complicit in progress or oppression. They appear as mere executioners of the politics of representation, servicing blindly political projects. This thesis gave them a voice and brings their everyday world in to bear on the discussion.

What emerged, as a consequence, is that the politics of GIS use is contingent on how GIS is understood and the extent to which this understanding is shared. Mappers are not silent at all but play a role in negotiating amongst themselves and with their clients the meaning and purpose of GIS. The politics of GIS and the politics of Peace Operations – not separately but together – are contingent on the negotiation of the epistemological fault. The fault is constituted by the politics of representation and the relationship of politics and logistics. Always contingent, the fault is not structural but a negotiation of understanding that the map is (not) the world and that mapping is (not) a political practice.

The map is (not) the world

Branch and Strandsbjerg have shown the central role cartography played in the shift from a holistic worldview to a piecemeal emergence of a world consistent of states. This constitutes the cartographic imagination which has come to be normalized: the map is the world. Chapter 4 and 5 demonstrated that the cartographic imagination is still actively framing the way in which policy is spatially conceived. Underlying the concept of territory, space is homogenous, calculable, and divisible along straight lines. As the decentralization reform process in Timor-Leste showed, building the state is fundamentally rooted in these assumptions. Administrative units can be created by

drawing lines on a flat surface, and merging communities together. These assumptions make synonymous the map with space. As the mapping projects demonstrated, the notion is that communities can be located and attributed spatial coordinates.

Yet, because the cartographic imagination is normalized, it is assumed that the map can simply capture the world. Many clients do not understand that this capturing is an abstraction with a particular purpose which requires a complex socio-material production. At times however, this production breaks down, or cannot grasp the world and people it ought to map, and even faces resistance and conflict. When the map is understood as the world, these problems are a mere issue of better coordination and scientific rigor. They are a mere matter of logistics. GIS as a technology is seen as having the potential to make the conflict go away. GIS practitioners, on the other hand, understand the politics of representation. The map is not 'the real' but a product of mathematical intervention, and purposeful manipulation. As a artefact it inscribes particular purpose. Conflict is therefore not a surprise but part and parcel of the mapping project.

The epistemological fault is thus manifested in the politics of representation. And it influences how mapping works in the field. In Timor-Leste, many stakeholders were not aware of maps or did not understand why I would ask about them. This underlines the normalization. On the other hand, mappers complained of a lack of resources and that their clients did not understand why administrative boundary delineation was a problem. Accounting for the epistemological fault through the politics of representation offers a different picture of GIS use. Rather than driven by its assumptions as a tool for progress or oppression, its integration is contingent on how it is understood.

Mapping is (not) a political practice

The epistemological fault is also manifest in how the relationship between politics and logistics is understood. The negotiation between mapping as logistical and political practice was evident in the field mission, the GIS Center and Cartographic Section. Indeed, their very arrangement evolved and still moves around this tenuous relationship. Chapter 6 laid out this contingent organization of GIS within the UN. The history of the Cartographic Section illustrated this tension: the section moved between political and a-politcal support departments. Some maps were considered not for public consumption but not based on any specific criteria. Now, mapping is deeply buried in the Department of Field Support under the Logistics Division. Importantly, this history is a product of the conversations with mappers during my fieldwork. It is not inscribed anywhere at the sites or within the United Nations. It represents the understanding and experiences of the mappers themselves.

The current institutional arrangement of mapping mirrors the separation of politics and logistics. GIS mapping, now located within logistics, is institutionally separated from the political clients it ought to serve. Moreover, considering mapping as nothing more than producing tools, dependent on a task, the GIS mapping community is also separated from one another within different logistics branches. Logistics broadly, and GIS mapping specifically, is rendered an afterthought to the political endeavour of state-building. Political projects, that is, matters of policy and mission mandate, are not only separate from spatial logistics but also prioritized over it. Over the years, the demand for GIS mapping has been increasing. Yet, it is only drawn on when deemed necessary to the implementation of clients' projects. And since the understanding of what GIS is and can

do is limited, its use is at times arbitrary and often ad hoc. Again, it is evident that the lack of understanding of GIS, particularly its framing as mere logistics, has far reaching implications. Mapping is under-resourced in terms of materials, budgets and skilled personnel. Rather than complicit in the empire of progress or oppression, GIS mapping is slightly starved and institutionally isolated from its clients.

From a practice perspective, these structures which separate GIS from its clients however, are not seen as *a priori* or structurally deterministic. Practice emphasizes that order is always a production process in which materials and humans act together. Thus, structures always require enactment. And enactment is not necessarily affirming in nature but can also be contesting, producing literally new fields of possibility. Consequently, we can see how mappers enact the current structure as well as contest it. The brochures and PowerPoint slides, produced by the Cartographic Section for example, affirm the separation. They demonstrate an efficient logistical service, meeting client demands. GIS practitioners hope to thereby increase awareness and gain more clients.

However at the same time, mappers contest the separation, as they see it as inhibiting the proliferation of GIS and the awareness of what it is and can do. Through lobbying and establishing 'working' relationships, GIS practitioners seek to educate policy-makers. By explaining what they do and how it could potentially aid the political objectives, they hope to widen their client base. Understanding GIS requires an account of how it is organized. Yet, this is not a mere structural question. It is contingent on the affirmation and contestation of the separation of politics from logistics. This too renders the use of GIS contingent.

Traversing the fault

The epistemological fault, as manifest in the politics of representation and the relationship between politics and logistics, is contingent. Thus, the space in-between, is affirmed, contested or traversed in practice. The 'sharing' of understanding GIS is framed by the professional cultures of the interlocutors, i.e. the mappers and their clients. These cultures bear intelligibilities which render the world knowable in certain ways and set out the conditions in which translation is possible.

The professional culture of mappers, thus far absent from the debate on GIS, consists of their everyday interactions, negotiations, tasks and challenges, and how they understand their work and perceive the environment in which they work. Specifically, mapping culture is characterized by the complex and sophisticated technological expertise of mappers, as well as the political dimensions of their work. Rather than a linear process, merely requiring execution, mapping is a socio-material practice which is contingent on the construction, sharing and interpretation of cartographic rules. As a community they produce meaning and manage, an a times difficult, material environment, rendering mapping itself a contingent process. Understanding the world from the perspective of map-production does not easily merge with the less-well understood culture of their clients. Mappers know that their clients have a different intelligibility. They produce texts and work with lists. They do not follow the same logic of data collection and visual abstraction. They are not as aware of the processes of visual representation and its effects.

This puts horizontal interoperability at stake, i.e. whether the culture of mappers and their clients is compatible in order to share

understanding. In other words, can clients learn about the politics of representation and mapping as political practice? Can they embody and enact this knowledge by integrating into their intelligibility? I have shown that achieving interoperability is a process of constant negotiation. It has the effect that assumptions on both sides, mappers and clients, become more explicitly articulated. This renders the politics of GIS and the politics of Peace Operations contingent. They may become more value-conscious or more instrumentalist. Politics however, is located in this struggle of negotiation. It is not inherent in universalist assumptions or the technology itself.

In sum, the findings of this research project demonstrate that mapping as an instance of logistics is a political practice. It is part and parcel of Peace Operations. Yet, the nature of its relationship to Peace Operations is constantly negotiated. At stake is the understanding of the map, particularly, the politics of representation. Mapping is thus not a mere handmaiden to either empire or progress. It does not represent the blind mechanical execution of assumptions. Mappers have agency in reflexively articulating assumptions. Here, the possibility of learning and reflecting emerges. Some interactions around the map prompt these reflections. In other words, difference in terms of the politics of Peace Operations can occur from the interaction between different professional cultures constituting the Peace Operation actors. Politics is not merely the consequence of static universalist assumptions or a turn towards the local. Different understandings and perspectives already exist within the United Nations. They exist in places that are framed as a-political, such as logistics.

Reflections on Research Process

The multi-site fieldwork for this thesis represented a serious challenge as well as a great opportunity. Gaining access to,

organizing travel and collecting data at three different field sites required stubbornness, improvisation, adaptability and dedicated planning. As I already mentioned in chapter 3 on methodology, it was difficult to gain access to these sites, particularly New York and Brindisi. I had to keep trying to contact GIS practitioners in different ways and was at last successful. The mappers were not used to participate in research in which they were the subjects. This required some careful explanation of the process and adaptation of questions.

Italy, the United States, and Timor-Leste, a military base, the UN headquarters, and a field mission in a post-conflict country, all represented very different environments to conduct research in. I had to adapt. The security situation in Timor was stable during my visit and therefore did not prohibit my research. However, I could sense the trauma that had occurred in the country without fully comprehending it. In Timor, a society was trying to maintain its peace and heal from the wounds of its past. I was aware that asking questions about logistics and maps weighed heavier than, for example in New York. And some people I encountered, even felt somewhat offended that I would waste my research time on matters as inconsequential as maps. For them peace and development were at stake.

Gaining access to the NATO base which houses the UN Logistics base in Italy represented a different challenge. In this instance, I was the one who represented more of a security threat, and thus had to be accounted for and 'secured.' This meant that my time there was limited. New York felt the most fragmented in terms of mapping practice. The Cartographic Section sits in a small office within a huge institutional architecture constituting the UN headquarters. Access here was only possible through daily sign-ins from staff. They seemed particularly busy and I felt a different sort of pressure. I did not want

to waste their time. Overall, therefore, the field experiences were hugely varied and yet, a common story emerged.

I was inspired by Sassen's notion of digging in the shadows, of investigating the penumbra created by master categories, as she put it (2009). Wandering these different sites I was not interested in the politics of oppression or progress. I was looking for the everyday negotiations and sense-making processes. I sought to construct meaning from the bottom-up. Walking in the shadows, I directed light towards mappers and the world in which the work. I produced a representation of the mapping world which did not exist in any literatures. I had to investigate like a detective the architecture of the UN's mapping sites. Following mapping practice allowed the field to emerge, the characteristics and meaning of which are produced through the perspective of the mappers. My priority of understanding mappers and their world rendered a thorough investigation of clients beyond the scope. Indeed, this represents an area where further research is needed.

Finally, I want to very briefly summarize the merit and contribution of a practice methodology, particularly to inter-disciplinary research. Understanding GIS use in UN Peace Operations represented an inter-disciplinary research task. Thus, the introduction to this thesis surveyed a variety of disciplinary literatures, in order to contextualize the problem of interest. At the same time however, that meant that the problem required a methodological and theoretical framing which could harness and weave these literatures together. Practice research allows this. It somewhat inverses the theoretical and empirical relationship. Following the actors and their practices it allows for a drawing in of theory rather than letting the theory completely frame the problem. The contribution of abduction as a methodological

strategy lies in it allowing for explicit an oscillating between theory and field as a way of analysis and sense-making.

Moreover, practice methodology lends itself to capturing spaces of contingency by allowing for a close proximity between researcher and participant and a focus on the everyday. Rather than glossing over negotiations and focusing on 'master categories,' practice highlights how these are produced, contested, re-affirmed or overhauled. In this sense it is not merely concerned with the outcome of negotiations but also ways in which these negotiations proceed, and how they are conditioned. This is evident in this project which detailed the circulating understandings of GIS, how they are constituted and negotiated, only to then tease out what the implications are. Highlighting these negotiations unearths thus far unconsidered contingent spaces in which difference can emerge.

Future Directions and Implications:

Maps and Space

Some of the cartographic literature focuses on the historical excavation of the roles maps have played particularly in the bringing about of states. I gave examples of these in chapter 2: Branch outlining the role of maps in the constitution of France (2011), Winikachul focusing on Siam (1997), and Strandsbjerg on Denmark (2010). These excavations are important as they tell the logistics stories underwriting the possibility of imagining these states in the first place. Not only wars bring about states. Maps do too. Branch and Strandsbjerg have introduced the cartographic literature into the IR discipline in order to enrich and amend the state formation literature. Yet, there is a logical conclusion of this kind of thinking to be followed through on. If the map inscribes the cartographic imagination, which has become so normalized that it still frames the

spatial imagination of policy, then what about new mapping technologies and different actors using it.

Branch argues that mapping, in the context of state formation, was under the purview of the state. Today, from openstreet map to mobile phone apps to social network analysis software, mapping technologies take a variety of different forms. And they are operated by a variety of actors, from the everyday citizen, to non-state organizations, and states. Branch's call to investigate what kinds of imaginations and spatial constitutions are being produced through maps, new mapping technology and different actors, thus remains a call to be answered. It lay beyond the scope of this thesis to examine questions such as: Does satellite imagery reinforce or alter the cartographic imagination? Do social network analysis applications undermine the imagination of the state system? Do the different actors, operating mapping applications, reframe power relationships in the international system? Do they have a democratizing effect? What are the possibilities of resistance? Whether representational or practice analyses, maps ubiquitously circulate in our everday lives and have effects. IR should take a closer look at all the obvious and not so obvious spaces in which they do work.

Indeed, space in IR requires more explicit attention. Like gender, it is co-constitutive of everything and yet still seems to be a sub-category. Drawing on literature in human geography for example seems very productive as they do political analyses but tie space in. Space as a category and concept require greater attention. Building into the IR canon the 'spatial turn' may allow us to explicitly move beyond space as flat, homogenous, tied to Euclidean geometry, as merely a stage for politics. Taking a stance on space helps to reiteratively articulate how it is always already implicated in politics and as such exerts force. Whether through scalar analyses, human geographies, or as

multiplicitous concept à la Soja's Thirdspace (1996), as Massay argues, space matters (2005). In IR we need to pay more attention to how it works, spaces are built and constitute subjects.

Understanding Logistics - Constructively and Critically

Here, I briefly return to Sørensen's call, outlined in the introduction to this thesis, on examining technology and politics constructively and critically. This call is central to the spirit of this thesis and can signpost implications for future research. These implications are about contingency and possibility for difference. The map as a technology has effects in the world. It writes in and it writes out. It represents a purpose which may work in the interest of the few. It may work to oppress by rendering the written-out invisible or make spaces seem available for governance. These are indeed possibilities. The critical literatures in geography, cartography or GIS studies have rehearsed these at length.

Yet, they do not have a sensibility to discover nuance within these deconstructive stories where negotiations between practitioners for example, open up spaces for difference. The deconstructive analyses ought to represent a sensitizing framework. We ought not to forget the real impact technologies can have in the world and the power relationships they inscribe. However, a constructive analysis does not merely turn to analyse a case of the use of maps as resistance in order to represent a counter-weight. Maps can be oppressive or emancipatory. Sørensen's call to engage with technology *simultaneously* critically and constructively, means to find the nuance and to complicate a smooth narrative. This safeguards against a glossing over of actors and spaces in which everyday negotiation and meaning-making, and even resistance produce change.

Finally, this thesis has demonstrated the utility of introducing logistics into the study of international politics. While logistics in this project has been viewed through the particular lens of mapping and therefore with specificity, its institutional situation and conceptual framing unearthed the broader notion of logistics as a-political. Logistics is seen as a repository of tools (such as technologies) and experts of these tools who use them to operationalize political objectives. Yet, bringing logistics into the realm of politics, acknowledging that it conditions the possibility of political objectives and shape their implementation, reframes the traditional parameters of the study of international politics. In the introduction to this thesis I mentioned Cowen's recent work on logistics which specifically focuses on how logistics make the world. As already mentioned, in her 2010 article she deals with the rise of what she calls business logistics "as a highly specialized form of spatial calculation [...] crucial but overlooked in the process of space-time compression that has remade geographies of capitalist production and distribution at a global scale" (2010: 3). She unearths the tenuous intersection between tight borders and global flows in that the networked and neo-liberal spaces produced through logistics in order to maintain the efficient flow of goods and services challenge the traditional national and territorial forms of security (ibid). Logistics is 'deeply political' as the remaking of space has violent effects for the labour force and their political claims (2010, 2014).

Cowen makes an important intervention to draw out the increasingly important role of logistics and how its neo-liberal logics accelerate the making of capitalist spaces. She propels an agenda I share in this project, namely that logistics is important, is political and therefore we should pay more attention to it. However, it is important to draw out the distinction between her and my work and thereby sketch out a different trajectory in terms of avenues for further research. First,

the context in which logistics happens matters as I set out in the introduction to this thesis. Cowen's work deals with logistics in the context of the global capitalist system by focusing on port supply chains. My work deals with logistics in the context of Peace Operations by focusing on GIS mapping. A practice perspective forces us acknowledge difference in context. She is dealing with a world which is ruled by logistics, indeed, she states that the "logistics now typically lead rather than support the strategy of firms and the security of nations" (2010: 3). Mapping in the context of Peace Operations does not lead strategy. On the contrary, as this study has shown, mappers struggle for visibility and gaining new clients. We ought to study logistics in different settings, yet we must acknowledge the specificity of these.

Second, the level and angle of study matters. Cowen highlights the definitve impact of business logistics which seeks to secure the supply chain on all costs on workers for example. Political claims for economic democracy or social rights which interfere with the priority of the market, she argues, are constructed as security threats and therefore must be eliminated (2010: 17). My work focused on the operators of logistics, in this case map-makers, and how they understand their own work. I highlighted that logistics in the instance of GIS mapping is not an efficiently functioning system but one which breaks down, is under-resourced and mis-understood rendering its effects contingent. It is in fact from the mappers' perspective a site of struggle in which the political effects are not inherent to the technology but at stake in the everyday negotiations. It is these negotiations, the interactions between map-makers and clients, between map-makers and the world which make mapping and its logistics contingent. The map's categories do not *a priori* make the world. Map-makers, as this investigation has shown are aware that the categories they use and the lines they draw have effects in

the world. Cowen asks at the end of her 2010 article, what critical logistics could look like (p. 17). Unearthing the contingent spaces in GIS-use at the UN highlighted the heterogeneous voices which engaged reflectively in discussing the impact of their work. As academics, we need to pay attention to these. As we highlight them and give them voice and space in our studies we show and thereby acknowledge that there are possibilities for difference. There are spaces in which actors reflectively acknowledge the potential impact of their work. Importantly, this does not mean that the map-makers at the UN are changing Peace Operations politics. What it does mean is that they are part and parcel of that politics. As a consequence of this thesis, more research on how state-building works logistically is therefore needed. The question of how states are built in these missions still begs answering. How do other logistics branches relate to political stakeholders of missions? How do they negotiate objectives? What are their conditions of possibility? An understanding of mission operations and their politics ought to include that which makes them possible.

This brings us full circle back to Autesserre's work and her twofold argument which is instructive for further research in peace and conflict studies. On the one hand, as she has shown through her research on the Congo, the peacebuilding top-down narrative is strong and drowns out bottom-up voices while on the other, this narrative is only ever as strong as the extent to which it is shared. This thesis has sought to highlight the hetereogeneity of voices that exist within an organization like the UN. It has particualrly focused on socio-material processes around the use of technology which open up and conjure up questions of interpretation and implementation. These are spaces which have thus far been largely unexplored. Therefore, further research, delving deeper and allowing for close encounter with these socio-material practices constituting Peace

Operations represents an important agenda for peace and conflict studies. This thesis did not show that mapping's contingent spaces fundamentally altered dominant Peace Operation narratives. Yet, it disrupted the notion that reflective and contingent spaces are absent. This is important because, as previously pointed out, the contribution of this kind of research does not end with the writing of papers highlighting heterogeneous voices or disclosing contingent spaces of negotiation. The very act of embarking on this kind of research draws attention to contingency, thereby recasting the space which constitutes legitimate narratives, knowledge and practice. Thus, contingency is made part of the legitimate space. Academics, not just the research agenda itself play an important role.

In closing, I would like to reiterate what I hope this thesis does for the reader: Never look at a map as if it were a mere picture. See through its layers. Let it unfold in your mind into its time and place of production, its producers, users, their conversations and discussions, and the materials and tools used to produce it. Let the map leak.

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